What is claimed is:

1. A method of forming a tubular liner within a preexisting structure, comprising:
positioning a tubular assembly within the preexisting structure; and
radially expanding and plastically deforming the tubular assembly within the preexisting structure;
wherein, prior to the radial expansion and plastic deformation of the tubular assembly, a predetermined portion of the tubular assembly has a lower yield point than another portion of the tubular assembly.

2. The method of claim 1, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

3. The method of claim 1, wherein the predetermined portion of the tubular assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

4. The method of claim 1, wherein the predetermined portion of the tubular assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

5. The method of claim 1, wherein the predetermined portion of the tubular assembly has a larger inside diameter after the radial expansion and plastic deformation than other portions of the tubular assembly.

6. The method of claim 5, further comprising:
positioning another tubular assembly within the preexisting structure in overlapping relation to the tubular assembly; and
radially expanding and plastically deforming the other tubular assembly within the preexisting structure;
wherein, prior to the radial expansion and plastic deformation of the tubular assembly, a predetermined portion of the other tubular assembly has a lower yield point than another portion of the other tubular assembly.

7. The method of claim 6, wherein the inside diameter of the radially expanded and plastically deformed other portion of the tubular assembly is equal to the inside diameter of

the radially expanded and plastically deformed other portion of the other tubular assembly.

8. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.

9. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.

10. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.

11. The method of claim 1, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.

12. The method of claim 1, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.

13. The method of claim 1, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.

14. The method of claim 1, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

15. The method of claim 14, wherein the tubular couplings comprise the predetermined portions of the tubular assembly; and wherein the tubular members comprise the other portion of the tubular assembly.

16. The method of claim 14, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.

17. The method of claim 14, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.

18. The method of claim 1, wherein the predetermined portion of the tubular assembly defines one or more openings.

19. The method of claim 18, wherein one or more of the openings comprise slots.

20. The method of claim 18, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

21. The method of claim 1, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

22. The method of claim 1, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

23. The method of claim 1, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

24. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

25. The method of claim 24, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

26. The method of claim 24, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

27. The method of claim 24, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.48.

28. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

29. The method of claim 28, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic

deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

30. The method of claim 28, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

31. The method of claim 28, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.04.

32. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

33. The method of claim 32, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.92.

34. The method of claim 1, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

35. The method of claim 34, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.34.

36. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

37. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

38. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about

1.48.

39. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

40. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

41. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.

42. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.

43. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.

44. The method of claim 1, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

45. The method of claim 1, wherein the yield point of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

46. The method of claim 1, wherein the expandability coefficient of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.

47. The method of claim 1, wherein the expandability coefficient of the predetermined

portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.

48. The method of claim 1, wherein the tubular assembly comprises a wellbore casing.

49. The method of claim 1, wherein the tubular assembly comprises a pipeline.

50. The method of claim 1, wherein the tubular assembly comprises a structural support.

51. An expandable tubular member comprising a steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

52. The tubular member of claim 51, wherein a yield point of the tubular member is at most about 46.9 ksi prior to a radial expansion and plastic deformation; and wherein a yield point of the tubular member is at least about 65.9 ksi after the radial expansion and plastic deformation.

53. The tubular member of claim 51, wherein the yield point of the tubular member after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the tubular member prior to the radial expansion and plastic deformation.

54. The tubular member of claim 51, wherein the anisotropy of the tubular member, prior to a radial expansion and plastic deformation, is about 1.48.

55. The tubular member of claim 51, wherein the tubular member comprises a wellbore casing.

56. The tubular member of claim 51, wherein the tubular member comprises a pipeline.

57. The tubular member of claim 51, wherein the tubular member comprises a structural support.

58. An expandable tubular member comprising a steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

59. The tubular member of claim 58, wherein a yield point of the tubular member is at most about 57.8 ksi prior to a radial expansion and plastic deformation; and wherein the

yield point of the tubular member is at least about 74.4 ksi after the radial expansion and plastic deformation.

60. The tubular member of claim 58, wherein a yield point of the of the tubular member after a radial expansion and plastic deformation is at least about 28 % greater than the yield point of the tubular member prior to the radial expansion and plastic deformation.

61. The tubular member of claim 58, wherein the anisotropy of the tubular member, prior to a radial expansion and plastic deformation, is about 1.04.

62. The tubular member of claim 58, wherein the tubular member comprises a wellbore casing.

63. The tubular member of claim 58, wherein the tubular member comprises a pipeline.

64. The tubular member of claim 58, wherein the tubular member comprises a structural support.

65. An expandable tubular member comprising a steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

66. The tubular member of claim 65, wherein the anisotropy of the tubular member, prior to a radial expansion and plastic deformation, is about 1.92.

67. The tubular member of claim 65, wherein the tubular member comprises a wellbore casing.

68. The tubular member of claim 65, wherein the tubular member comprises a pipeline.

69. The tubular member of claim 65, wherein the tubular member comprises a structural support.

70. An expandable tubular member comprising a steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

71. The tubular member of claim 70, wherein the anisotropy of the tubular member, prior to a radial expansion and plastic deformation, is about 1.34.

72. The tubular member of claim 70, wherein the tubular member comprises a wellbore casing.

73. The tubular member of claim 70, wherein the tubular member comprises a pipeline.

74. The tubular member of claim 70, wherein the tubular member comprises a structural support.

75. An expandable tubular member, wherein the yield point of the expandable tubular member is at most about 46.9 ksi prior to a radial expansion and plastic deformation; and wherein the yield point of the expandable tubular member is at least about 65.9 ksi after the radial expansion and plastic deformation.

76. The tubular member of claim 75, wherein the tubular member comprises a wellbore casing.

77. The tubular member of claim 75, wherein the tubular member comprises a pipeline.

78. The tubular member of claim 75, wherein the tubular member comprises a structural support.

79. An expandable tubular member, wherein a yield point of the expandable tubular member after a radial expansion and plastic deformation is at least about 40 % greater than the yield point of the expandable tubular member prior to the radial expansion and plastic deformation.

80. The tubular member of claim 79, wherein the tubular member comprises a wellbore casing.

81. The tubular member of claim 79, wherein the tubular member comprises a pipeline.

82. The tubular member of claim 79, wherein the tubular member comprises a structural support.

83. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, is at least about 1.48.

84. The tubular member of claim 83, wherein the tubular member comprises a wellbore casing.

85. The tubular member of claim 83, wherein the tubular member comprises a pipeline.

86. The tubular member of claim 83, wherein the tubular member comprises a structural support.

87. An expandable tubular member, wherein the yield point of the expandable tubular member is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the expandable tubular member is at least about 74.4 ksi after the radial expansion and plastic deformation.

88. The tubular member of claim 87, wherein the tubular member comprises a wellbore casing.

89. The tubular member of claim 87, wherein the tubular member comprises a pipeline.

90. The tubular member of claim 87, wherein the tubular member comprises a structural support.

91. An expandable tubular member, wherein the yield point of the expandable tubular member after a radial expansion and plastic deformation is at least about 28 % greater than the yield point of the expandable tubular member prior to the radial expansion and plastic deformation.

92. The tubular member of claim 91, wherein the tubular member comprises a wellbore casing.

93. The tubular member of claim 91, wherein the tubular member comprises a pipeline.

94. The tubular member of claim 91, wherein the tubular member comprises a structural support.

95. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, is at least about 1.04.

96. The tubular member of claim 95, wherein the tubular member comprises a wellbore casing.

97. The tubular member of claim 95, wherein the tubular member comprises a pipeline.

98. The tubular member of claim 95, wherein the tubular member comprises a structural support.

99. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, is at least about 1.92.

100. The tubular member of claim 99, wherein the tubular member comprises a wellbore casing.

101. The tubular member of claim 99, wherein the tubular member comprises a pipeline.

102. The tubular member of claim 99, wherein the tubular member comprises a structural support.

103. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, is at least about 1.34.

104. The tubular member of claim 103, wherein the tubular member comprises a wellbore casing.

105. The tubular member of claim 103, wherein the tubular member comprises a pipeline.

106. The tubular member of claim 103, wherein the tubular member comprises a structural support.

107. An expandable tubular member, wherein the anisotropy of the expandable tubular member, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

108. The tubular member of claim 107, wherein the tubular member comprises a wellbore casing.

109. The tubular member of claim 107, wherein the tubular member comprises a pipeline.

110. The tubular member of claim 107, wherein the tubular member comprises a structural support.

111. An expandable tubular member, wherein the yield point of the expandable tubular member, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

112. The tubular member of claim 111, wherein the tubular member comprises a wellbore casing.

113. The tubular member of claim 111, wherein the tubular member comprises a pipeline.

114. The tubular member of claim 111, wherein the tubular member comprises a structural support.

115. An expandable tubular member, wherein the expandability coefficient of the expandable tubular member, prior to the radial expansion and plastic deformation, is greater than 0.12.

116. The tubular member of claim 115, wherein the tubular member comprises a wellbore casing.

117. The tubular member of claim 115, wherein the tubular member comprises a pipeline.

118. The tubular member of claim 115, wherein the tubular member comprises a structural support.

119. An expandable tubular member, wherein the expandability coefficient of the expandable tubular member is greater than the expandability coefficient of another portion of the expandable tubular member.

120. The tubular member of claim 119, wherein the tubular member comprises a wellbore casing.

121. The tubular member of claim 119, wherein the tubular member comprises a pipeline.

122. The tubular member of claim 119, wherein the tubular member comprises a structural support.

123. An expandable tubular member, wherein the tubular member has a higher ductility and a lower yield point prior to a radial expansion and plastic deformation than after the radial expansion and plastic deformation.

124. The tubular member of claim 123, wherein the tubular member comprises a wellbore casing.

125. The tubular member of claim 123, wherein the tubular member comprises a pipeline.

126. The tubular member of claim 123, wherein the tubular member comprises a structural support.

127. A method of radially expanding and plastically deforming a tubular assembly comprising a first tubular member coupled to a second tubular member, comprising:

radially expanding and plastically deforming the tubular assembly within a preexisting structure; and

using less power to radially expand each unit length of the first tubular member than to radially expand each unit length of the second tubular member.

128. The method of claim 127, wherein the tubular member comprises a wellbore casing.

129. The method of claim 127, wherein the tubular member comprises a pipeline.

130. The method of claim 127, wherein the tubular member comprises a structural support.

131. A system for radially expanding and plastically deforming a tubular assembly comprising a first tubular member coupled to a second tubular member, comprising:

means for radially expanding the tubular assembly within a preexisting structure; and

means for using less power to radially expand each unit length of the first tubular member than to radially expand each unit length of the second tubular member.

132. The system of claim 131, wherein the tubular member comprises a wellbore casing.

133. The system of claim 131, wherein the tubular member comprises a pipeline.

134. The system of claim 131, wherein the tubular member comprises a structural support.

135. A method of manufacturing a tubular member, comprising:
processing a tubular member until the tubular member is characterized by one or more intermediate characteristics;
positioning the tubular member within a preexisting structure; and
processing the tubular member within the preexisting structure until the tubular member is characterized one or more final characteristics.

136. The method of claim 135, wherein the tubular member comprises a wellbore casing.

137. The method of claim 135, wherein the tubular member comprises a pipeline.

138. The method of claim 135, wherein the tubular member comprises a structural support.

139. The method of claim 135, wherein the preexisting structure comprises a wellbore that traverses a subterranean formation.

140. The method of claim 135, wherein the characteristics are selected from a group consisting of yield point and ductility.

141. The method of claim 135, wherein processing the tubular member within the preexisting structure until the tubular member is characterized one or more final characteristics comprises:
radially expanding and plastically deforming the tubular member within the preexisting structure.

142. An apparatus, comprising:
an expandable tubular assembly; and
an expansion device coupled to the expandable tubular assembly;

wherein a predetermined portion of the expandable tubular assembly has a lower yield point than another portion of the expandable tubular assembly.

143. The apparatus of claim 142, wherein the expansion device comprises a rotary expansion device.

144. The apparatus of claim 142, wherein the expansion device comprises an axially displaceable expansion device.

145. The apparatus of claim 142, wherein the expansion device comprises a reciprocating expansion device.

146. The apparatus of claim 142, wherein the expansion device comprises a hydroforming expansion device.

147. The apparatus of claim 142, wherein the expansion device comprises an impulsive force expansion device.

148. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point than another portion of the expandable tubular assembly.

149. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly has a higher ductility than another portion of the expandable tubular assembly.

150. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly has a lower yield point than another portion of the expandable tubular assembly.

151. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.

152. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.

153. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.

154. The apparatus of claim 142, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.

155. The apparatus of claim 142, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.

156. The apparatus of claim 142, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.

157. The apparatus of claim 142, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

158. The apparatus of claim 157, wherein the tubular couplings comprise the predetermined portions of the tubular assembly; and wherein the tubular members comprise the other portion of the tubular assembly.

159. The apparatus of claim 157, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.

160. The apparatus of claim 157, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.

161. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly defines one or more openings.

162. The apparatus of claim 161, wherein one or more of the openings comprise slots.

163. The apparatus of claim 161, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

164. The apparatus of claim 142, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

165. The apparatus of claim 142, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

166. The apparatus of claim 142, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

167. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

168. The apparatus of claim 167, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi.

169. The apparatus of claim 167, wherein the anisotropy of the predetermined portion of the tubular assembly is about 1.48.

170. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

171. The apparatus of claim 170, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi.

172. The apparatus of claim 170, wherein the anisotropy of the predetermined portion of the tubular assembly is about 1.04.

173. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

174. The apparatus of claim 173, wherein the anisotropy of the predetermined portion of the tubular assembly is about 1.92.

175. The apparatus of claim 142, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

176. The apparatus of claim 175, wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.34.

177. The apparatus of claim 142, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi.

178. The apparatus of claim 142, wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.48.

179. The apparatus of claim 142, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi.

180. The apparatus of claim 142, wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.04.

181. The apparatus of claim 142, wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.92.

182. The apparatus of claim 142, wherein the anisotropy of the predetermined portion of the tubular assembly is at least about 1.34.

183. The apparatus of claim 142, wherein the anisotropy of the predetermined portion of the tubular assembly ranges from about 1.04 to about 1.92.

184. The apparatus of claim 142, wherein the yield point of the predetermined portion of the tubular assembly ranges from about 47.6 ksi to about 61.7 ksi.

185. The apparatus of claim 142, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than 0.12.

186. The apparatus of claim 142, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.

187. The apparatus of claim 142, wherein the tubular assembly comprises a wellbore casing.

188. The apparatus of claim 142, wherein the tubular assembly comprises a pipeline.

189. The apparatus of claim 142, wherein the tubular assembly comprises a structural support.

190. An expandable tubular member, wherein a yield point of the expandable tubular member after a radial expansion and plastic deformation is at least about 5.8 % greater than the yield point of the expandable tubular member prior to the radial expansion and plastic deformation.

191. The tubular member of claim 190, wherein the tubular member comprises a wellbore casing.

192. The tubular member of claim 190, wherein the tubular member comprises a pipeline.

193. The tubular member of claim 190, wherein the tubular member comprises a structural support.

194. A method of determining the expandability of a selected tubular member, comprising:
determining an anisotropy value for the selected tubular member;
determining a strain hardening value for the selected tubular member; and
multiplying the anisotropy value times the strain hardening value to generate an expandability value for the selected tubular member.

195. The method of claim 194, wherein an anisotropy value greater than 0.12 indicates that the tubular member is suitable for radial expansion and plastic deformation.

196. The method of claim 194, wherein the tubular member comprises a wellbore casing.

197. The method of claim 194, wherein the tubular member comprises a pipeline.

198. The method of claim 194, wherein the tubular member comprises a structural support.

199. A method of radially expanding and plastically deforming tubular members, comprising:
selecting a tubular member;
determining an anisotropy value for the selected tubular member;
determining a strain hardening value for the selected tubular member;

multiplying the anisotropy value times the strain hardening value to generate an expandability value for the selected tubular member; and

if the anisotropy value is greater than 0.12, then radially expanding and plastically deforming the selected tubular member.

200. The method of claim 199, wherein the tubular member comprises a wellbore casing.

201. The method of claim 199, wherein the tubular member comprises a pipeline.

202. The method of claim 199, wherein the tubular member comprises a structural support.

203. The method of claim 199, wherein radially expanding and plastically deforming the selected tubular member comprises:

inserting the selected tubular member into a preexisting structure; and

then radially expanding and plastically deforming the selected tubular member.

204. The method of claim 203, wherein the preexisting structure comprises a wellbore that traverses a subterranean formation.

205. A radially expandable tubular member apparatus comprising:

a first tubular member;

a second tubular member engaged with the first tubular member forming a joint; and

a sleeve overlapping and coupling the first and second tubular members at the joint;

wherein, prior to a radial expansion and plastic deformation of the apparatus, a predetermined portion of the apparatus has a lower yield point than another portion of the apparatus.

206. The apparatus of claim 205, wherein the predetermined portion of the apparatus has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

207. The apparatus of claim 205, wherein the predetermined portion of the apparatus has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

208. The apparatus of claim 205, wherein the predetermined portion of the apparatus has

a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

209. The apparatus of claim 205, wherein the predetermined portion of the apparatus has a larger inside diameter after the radial expansion and plastic deformation than other portions of the tubular assembly.

210. The apparatus of claim 209, further comprising:

positioning another apparatus within the preexisting structure in overlapping relation to the apparatus; and

radially expanding and plastically deforming the other apparatus within the preexisting structure;

wherein, prior to the radial expansion and plastic deformation of the apparatus, a predetermined portion of the other apparatus has a lower yield point than another portion of the other apparatus.

211. The apparatus of claim 210, wherein the inside diameter of the radially expanded and plastically deformed other portion of the apparatus is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other apparatus.

212. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises an end portion of the apparatus.

213. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a plurality of predetermined portions of the apparatus.

214. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a plurality of spaced apart predetermined portions of the apparatus.

215. The apparatus of claim 205, wherein the other portion of the apparatus comprises an end portion of the apparatus.

216. The apparatus of claim 205, wherein the other portion of the apparatus comprises a plurality of other portions of the apparatus.

217. The apparatus of claim 205, wherein the other portion of the apparatus comprises a plurality of spaced apart other portions of the apparatus.

218. The apparatus of claim 205, wherein the apparatus comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

219. The apparatus of claim 218, wherein the tubular couplings comprise the predetermined portions of the apparatus; and wherein the tubular members comprise the other portion of the apparatus.

220. The apparatus of claim 218, wherein one or more of the tubular couplings comprise the predetermined portions of the apparatus.

221. The apparatus of claim 218, wherein one or more of the tubular members comprise the predetermined portions of the apparatus.

222. The apparatus of claim 205, wherein the predetermined portion of the apparatus defines one or more openings.

223. The apparatus of claim 222, wherein one or more of the openings comprise slots.

224. The apparatus of claim 222, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1.

225. The apparatus of claim 205, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1.

226. The apparatus of claim 205, wherein the strain hardening exponent for the predetermined portion of the apparatus is greater than 0.12.

227. The apparatus of claim 205, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the apparatus is greater than 0.12.

228. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

229. The apparatus of claim 228, wherein the yield point of the predetermined portion of

the apparatus is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 65.9 ksi after the radial expansion and plastic deformation.

230. The apparatus of claim 228, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

231. The apparatus of claim 228, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.48.

232. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

233. The apparatus of claim 232, wherein the yield point of the predetermined portion of the apparatus is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 74.4 ksi after the radial expansion and plastic deformation.

234. The apparatus of claim 232, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

235. The apparatus of claim 232, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.04.

236. The apparatus of claim 205, wherein the predetermined portion of the apparatus comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

237. The apparatus of claim 236, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.92.

238. The apparatus of claim 205, wherein the predetermined portion of the apparatus

comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

239. The apparatus of claim 238, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.34.

240. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 65.9 ksi after the radial expansion and plastic deformation.

241. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

242. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.48.

243. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 74.4 ksi after the radial expansion and plastic deformation.

244. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

245. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.04.

246. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.92.

247. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.34.

248. The apparatus of claim 205, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

249. The apparatus of claim 205, wherein the yield point of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

250. The apparatus of claim 205, wherein the expandability coefficient of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is greater than 0.12.

251. The apparatus of claim 205, wherein the expandability coefficient of the predetermined portion of the apparatus is greater than the expandability coefficient of the other portion of the apparatus.

252. The apparatus of claim 205, wherein the apparatus comprises a wellbore casing.

253. The apparatus of claim 205, wherein the apparatus comprises a pipeline.

254. The apparatus of claim 205, wherein the apparatus comprises a structural support.

255. A radially expandable tubular member apparatus comprising:
a first tubular member;
a second tubular member engaged with the first tubular member forming a joint;
a sleeve overlapping and coupling the first and second tubular members at the joint;
the sleeve having opposite tapered ends and a flange engaged in a recess formed in an adjacent tubular member; and
one of the tapered ends being a surface formed on the flange;
wherein, prior to a radial expansion and plastic deformation of the apparatus, a predetermined portion of the apparatus has a lower yield point than another portion of the apparatus.

256. The apparatus as defined in claim 255 wherein the recess includes a tapered wall in mating engagement with the tapered end formed on the flange.

257. The apparatus as defined in claim 255 wherein the sleeve includes a flange at each tapered end and each tapered end is formed on a respective flange.

258. The apparatus as defined in claim 257 wherein each tubular member includes a recess.

259. The apparatus as defined in claim 258 wherein each flange is engaged in a respective one of the recesses.

260. The apparatus as defined in claim 259 wherein each recess includes a tapered wall in mating engagement with the tapered end formed on a respective one of the flanges.

261. The apparatus of claim 255, wherein the predetermined portion of the apparatus has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

262. The apparatus of claim 255, wherein the predetermined portion of the apparatus has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

263. The apparatus of claim 255, wherein the predetermined portion of the apparatus has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

264. The apparatus of claim 255, wherein the predetermined portion of the apparatus has a larger inside diameter after the radial expansion and plastic deformation than other portions of the tubular assembly.

265. The apparatus of claim 264, further comprising:

positioning another apparatus within the preexisting structure in overlapping relation to the apparatus; and

radially expanding and plastically deforming the other apparatus within the preexisting structure;

wherein, prior to the radial expansion and plastic deformation of the apparatus, a predetermined portion of the other apparatus has a lower yield point than another portion of the other apparatus.

266. The apparatus of claim 265, wherein the inside diameter of the radially expanded and plastically deformed other portion of the apparatus is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other apparatus.

267. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises an end portion of the apparatus.

268. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a plurality of predetermined portions of the apparatus.

269. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a plurality of spaced apart predetermined portions of the apparatus.

270. The apparatus of claim 255, wherein the other portion of the apparatus comprises an end portion of the apparatus.

271. The apparatus of claim 255, wherein the other portion of the apparatus comprises a plurality of other portions of the apparatus.

272. The apparatus of claim 255, wherein the other portion of the apparatus comprises a plurality of spaced apart other portions of the apparatus.

273. The apparatus of claim 255, wherein the apparatus comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

274. The apparatus of claim 273, wherein the tubular couplings comprise the predetermined portions of the apparatus; and wherein the tubular members comprise the other portion of the apparatus.

275. The apparatus of claim 273, wherein one or more of the tubular couplings comprise the predetermined portions of the apparatus.

276. The apparatus of claim 273, wherein one or more of the tubular members comprise the predetermined portions of the apparatus.

277. The apparatus of claim 255, wherein the predetermined portion of the apparatus

defines one or more openings.

278. The apparatus of claim 277, wherein one or more of the openings comprise slots.

279. The apparatus of claim 277, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1.

280. The apparatus of claim 255, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1.

281. The apparatus of claim 255, wherein the strain hardening exponent for the predetermined portion of the apparatus is greater than 0.12.

282. The apparatus of claim 255, wherein the anisotropy for the predetermined portion of the apparatus is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the apparatus is greater than 0.12.

283. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

284. The apparatus of claim 283, wherein the yield point of the predetermined portion of the apparatus is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 65.9 ksi after the radial expansion and plastic deformation.

285. The apparatus of claim 283, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

286. The apparatus of claim 283, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.48.

287. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

288. The apparatus of claim 287, wherein the yield point of the predetermined portion of the apparatus is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 74.4 ksi after the radial expansion and plastic deformation.

289. The apparatus of claim 287, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

290. The apparatus of claim 287, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.04.

291. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

292. The apparatus of claim 291, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.92.

293. The apparatus of claim 255, wherein the predetermined portion of the apparatus comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

294. The apparatus of claim 293, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is about 1.34.

295. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 65.9 ksi after the radial expansion and plastic deformation.

296. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

297. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.48.

298. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the apparatus is at least about 74.4 ksi after the radial expansion and plastic deformation.

299. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the apparatus prior to the radial expansion and plastic deformation.

300. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.04.

301. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.92.

302. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is at least about 1.34.

303. The apparatus of claim 255, wherein the anisotropy of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

304. The apparatus of claim 255, wherein the yield point of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

305. The apparatus of claim 255, wherein the expandability coefficient of the predetermined portion of the apparatus, prior to the radial expansion and plastic deformation, is greater than 0.12.

306. The apparatus of claim 255, wherein the expandability coefficient of the predetermined portion of the apparatus is greater than the expandability coefficient of the

other portion of the apparatus.

307. The apparatus of claim 255, wherein the apparatus comprises a wellbore casing.

308. The apparatus of claim 255, wherein the apparatus comprises a pipeline.

309. The apparatus of claim 255, wherein the apparatus comprises a structural support.

310. A method of joining radially expandable tubular members comprising:
providing a first tubular member;
engaging a second tubular member with the first tubular member to form a joint;
providing a sleeve;
mounting the sleeve for overlapping and coupling the first and second tubular members at the joint;
wherein the first tubular member, the second tubular member, and the sleeve define a tubular assembly; and
radially expanding and plastically deforming the tubular assembly;
wherein, prior to the radial expansion and plastic deformation, a predetermined portion of the tubular assembly has a lower yield point than another portion of the tubular assembly.

311. The method of claim 310, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

312. The method of claim 310, wherein the predetermined portion of the tubular assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

313. The method of claim 310, wherein the predetermined portion of the tubular assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

314. The method of claim 310, wherein the predetermined portion of the tubular assembly has a larger inside diameter after the radial expansion and plastic deformation than the other portion of the tubular assembly.

315. The method of claim 314, further comprising:

positioning another tubular assembly within the preexisting structure in overlapping relation to the tubular assembly; and

radially expanding and plastically deforming the other tubular assembly within the preexisting structure;

wherein, prior to the radial expansion and plastic deformation of the tubular assembly, a predetermined portion of the other tubular assembly has a lower yield point than another portion of the other tubular assembly.

316. The method of claim 315, wherein the inside diameter of the radially expanded and plastically deformed other portion of the tubular assembly is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other tubular assembly.

317. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.

318. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.

319. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.

320. The method of claim 310, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.

321. The method of claim 310, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.

322. The method of claim 310, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.

323. The method of claim 310, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

324. The method of claim 323, wherein the tubular couplings comprise the predetermined portions of the tubular assembly; and wherein the tubular members comprise the other portion of the tubular assembly.

325. The method of claim 323, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.

326. The method of claim 323, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.

327. The method of claim 310, wherein the predetermined portion of the tubular assembly defines one or more openings.

328. The method of claim 327, wherein one or more of the openings comprise slots.

329. The method of claim 327, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

330. The method of claim 310, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

331. The method of claim 310, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

332. The method of claim 310, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

333. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

334. The method of claim 333, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

335. The method of claim 333, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the

radial expansion and plastic deformation.

336. The method of claim 333, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.48.

337. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

338. The method of claim 337, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

339. The method of claim 337, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

340. The method of claim 337, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.04.

341. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

342. The method of claim 341, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.92.

343. The method of claim 310, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

344. The method of claim 343, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.34.

345. The method of claim 310, wherein the yield point of the predetermined portion of the

tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

346. The method of claim 310, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

347. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.48.

348. The method of claim 310, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

349. The method of claim 310, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

350. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.

351. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.

352. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.

353. The method of claim 310, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about

1.04 to about 1.92.

354. The method of claim 310, wherein the yield point of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

355. The method of claim 310, wherein the expandability coefficient of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.

356. The method of claim 310, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.

357. The method of claim 310, wherein the tubular assembly comprises a wellbore casing.

358. The method of claim 310, wherein the tubular assembly comprises a pipeline.

359. The method of claim 310, wherein the tubular assembly comprises a structural support.

360. A method of joining radially expandable tubular members comprising:
providing a first tubular member;
engaging a second tubular member with the first tubular member to form a joint;
providing a sleeve having opposite tapered ends and a flange, one of the tapered ends being a surface formed on the flange;
mounting the sleeve for overlapping and coupling the first and second tubular members at the joint, wherein the flange is engaged in a recess formed in an adjacent one of the tubular members;
wherein the first tubular member, the second tubular member, and the sleeve define a tubular assembly; and
radially expanding and plastically deforming the tubular assembly;
wherein, prior to the radial expansion and plastic deformation, a predetermined portion of the tubular assembly has a lower yield point than another portion of the tubular assembly.

361. The method as defined in claim 360 further comprising:

providing a tapered wall in the recess for mating engagement with the tapered end formed on the flange.

362. The method as defined in claim 360 further comprising:
providing a flange at each tapered end wherein each tapered end is formed on a respective flange.

363. The method as defined in claim 362 further comprising:
providing a recess in each tubular member.

364. The method as defined in claim 363 further comprising:
engaging each flange in a respective one of the recesses.

365. The method as defined in claim 364 further comprising:
providing a tapered wall in each recess for mating engagement with the tapered end formed on a respective one of the flanges.

366. The method of claim 360, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

367. The method of claim 360, wherein the predetermined portion of the tubular assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

368. The method of claim 360, wherein the predetermined portion of the tubular assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

369. The method of claim 360, wherein the predetermined portion of the tubular assembly has a larger inside diameter after the radial expansion and plastic deformation than the other portion of the tubular assembly.

370. The method of claim 369, further comprising:
positioning another tubular assembly within the preexisting structure in overlapping relation to the tubular assembly; and
radially expanding and plastically deforming the other tubular assembly within the

preexisting structure;

wherein, prior to the radial expansion and plastic deformation of the tubular assembly, a predetermined portion of the other tubular assembly has a lower yield point than another portion of the other tubular assembly.

371. The method of claim 370, wherein the inside diameter of the radially expanded and plastically deformed other portion of the tubular assembly is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other tubular assembly.

372. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.

373. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.

374. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.

375. The method of claim 360, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.

376. The method of claim 360, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.

377. The method of claim 360, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.

378. The method of claim 360, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

379. The method of claim 378, wherein the tubular couplings comprise the predetermined portions of the tubular assembly; and wherein the tubular members comprise the other portion of the tubular assembly.

380. The method of claim 378, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.

381. The method of claim 378, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.

382. The method of claim 360, wherein the predetermined portion of the tubular assembly defines one or more openings.

383. The method of claim 382, wherein one or more of the openings comprise slots.

384. The method of claim 382, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

385. The method of claim 360, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

386. The method of claim 360, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

387. The method of claim 360, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

388. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

389. The method of claim 388, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

390. The method of claim 388, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

391. The method of claim 388, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.48.

392. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

393. The method of claim 392, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

394. The method of claim 392, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

395. The method of claim 392, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.04.

396. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

397. The method of claim 396, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.92.

398. The method of claim 360, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

399. The method of claim 398, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.34.

400. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

401. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

402. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.48.

403. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

404. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

405. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.

406. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.

407. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.

408. The method of claim 360, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

409. The method of claim 360, wherein the yield point of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about

47.6 ksi to about 61.7 ksi.

491. The method of claim 360, wherein the expandability coefficient of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.

492. The method of claim 360, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.

493. The method of claim 360, wherein the tubular assembly comprises a wellbore casing.

494. The method of claim 360, wherein the tubular assembly comprises a pipeline.

495. The method of claim 360, wherein the tubular assembly comprises a structural support.

496. The apparatus of claim 205, wherein at least a portion of the sleeve is comprised of a frangible material.

497. The apparatus of claim 205, wherein the wall thickness of the sleeve is variable.

498. The method of claim 310, wherein at least a portion of the sleeve is comprised of a frangible material.

499. The method of claim 310, wherein the sleeve comprises a variable wall thickness.

500. The apparatus of claim 205, further comprising:
means for increasing the axial compression loading capacity of the joint between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members.

501. The apparatus of claim 205, further comprising:
means for increasing the axial tension loading capacity of the joint between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members.

502. The apparatus of claim 205, further comprising:
means for increasing the axial compression and tension loading capacity of the joint between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members.

503. The apparatus of claim 205, further comprising:
means for avoiding stress risers in the joint between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members.

504. The apparatus of claim 205, further comprising:
means for inducing stresses at selected portions of the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members.

505. The apparatus of claim 205, wherein the sleeve is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.

506. The method of claim 310, further comprising:
maintaining the sleeve in circumferential tension; and
maintaining the first and second tubular members in circumferential compression.

507. The apparatus of claim 205, wherein the sleeve is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.

508. The apparatus of claim 205, wherein the sleeve is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.

509. The method of claim 310, further comprising:
maintaining the sleeve in circumferential tension; and
maintaining the first and second tubular members in circumferential compression.

510. The method of claim 310, further comprising:
maintaining the sleeve in circumferential tension; and
maintaining the first and second tubular members in circumferential compression.

511. The apparatus of claim 500, wherein the means for increasing the axial compression loading capacity of the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.

512. The apparatus of claim 501, wherein the means for increasing the axial tension loading capacity of the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.

513. The apparatus of claim 502, wherein the means for increasing the axial compression and tension loading capacity of the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.

514. The apparatus of claim 503, wherein the means for avoiding stress risers in the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.

515. The apparatus of claim 504, wherein the means for inducing stresses at selected portions of the coupling between the first and second tubular members before and after a radial expansion and plastic deformation of the first and second tubular members is circumferentially tensioned; and wherein the first and second tubular members are circumferentially compressed.

516. An expandable tubular assembly, comprising:
a first tubular member;
a second tubular member coupled to the first tubular member;
a first threaded connection for coupling a portion of the first and second tubular members;
a second threaded connection spaced apart from the first threaded connection for coupling another portion of the first and second tubular members;

a tubular sleeve coupled to and receiving end portions of the first and second tubular members; and

a sealing element positioned between the first and second spaced apart threaded connections for sealing an interface between the first and second tubular member;

wherein the sealing element is positioned within an annulus defined between the first and second tubular members; and

wherein, prior to a radial expansion and plastic deformation of the assembly, a predetermined portion of the assembly has a lower yield point than another portion of the apparatus.

517. The assembly of claim 516, wherein the predetermined portion of the assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

518. The assembly of claim 516, wherein the predetermined portion of the assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

519. The assembly of claim 516, wherein the predetermined portion of the assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

520. The assembly of claim 516, wherein the predetermined portion of the assembly has a larger inside diameter after the radial expansion and plastic deformation than other portions of the tubular assembly.

521. The assembly of claim 520, further comprising:

positioning another assembly within the preexisting structure in overlapping relation to the assembly; and

radially expanding and plastically deforming the other assembly within the preexisting structure;

wherein, prior to the radial expansion and plastic deformation of the assembly, a predetermined portion of the other assembly has a lower yield point than another portion of the other assembly.

522. The assembly of claim 521, wherein the inside diameter of the radially expanded and

plastically deformed other portion of the assembly is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other assembly.

523. The assembly of claim 516, wherein the predetermined portion of the assembly comprises an end portion of the assembly.

524. The assembly of claim 516, wherein the predetermined portion of the assembly comprises a plurality of predetermined portions of the assembly.

525. The assembly of claim 516, wherein the predetermined portion of the assembly comprises a plurality of spaced apart predetermined portions of the assembly.

526. The assembly of claim 516, wherein the other portion of the assembly comprises an end portion of the assembly.

527. The assembly of claim 516, wherein the other portion of the assembly comprises a plurality of other portions of the assembly.

528. The assembly of claim 516, wherein the other portion of the assembly comprises a plurality of spaced apart other portions of the assembly.

529. The assembly of claim 516, wherein the assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

530. The assembly of claim 529, wherein the tubular couplings comprise the predetermined portions of the assembly; and wherein the tubular members comprise the other portion of the assembly.

531. The assembly of claim 529, wherein one or more of the tubular couplings comprise the predetermined portions of the assembly.

532. The assembly of claim 529, wherein one or more of the tubular members comprise the predetermined portions of the assembly.

533. The assembly of claim 516, wherein the predetermined portion of the assembly defines one or more openings.

534. The assembly of claim 533, wherein one or more of the openings comprise slots.

535. The assembly of claim 533, wherein the anisotropy for the predetermined portion of the assembly is greater than 1.

536. The assembly of claim 516, wherein the anisotropy for the predetermined portion of the assembly is greater than 1.

537. The assembly of claim 516, wherein the strain hardening exponent for the predetermined portion of the assembly is greater than 0.12.

538. The assembly of claim 516, wherein the anisotropy for the predetermined portion of the assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the assembly is greater than 0.12.

539. The assembly of claim 516, wherein the predetermined portion of the assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

540. The assembly of claim 539, wherein the yield point of the predetermined portion of the assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

541. The assembly of claim 539, wherein the yield point of the predetermined portion of the assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the assembly prior to the radial expansion and plastic deformation.

542. The assembly of claim 539, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is about 1.48.

543. The assembly of claim 516, wherein the predetermined portion of the assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

544. The assembly of claim 543, wherein the yield point of the predetermined portion of

the assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

545. The assembly of claim 543, wherein the yield point of the predetermined portion of the assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the assembly prior to the radial expansion and plastic deformation.

546. The assembly of claim 543, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is about 1.04.

547. The assembly of claim 516, wherein the predetermined portion of the assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

548. The assembly of claim 547, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is about 1.92.

549. The assembly of claim 516, wherein the predetermined portion of the assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

550. The assembly of claim 549, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is about 1.34.

551. The assembly of claim 516, wherein the yield point of the predetermined portion of the assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

552. The assembly of claim 516, wherein the yield point of the predetermined portion of the assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the assembly prior to the radial expansion and plastic deformation.

553. The assembly of claim 516, wherein the anisotropy of the predetermined portion of

the assembly, prior to the radial expansion and plastic deformation, is at least about 1.48.

554. The assembly of claim 516, wherein the yield point of the predetermined portion of the assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

555. The assembly of claim 516, wherein the yield point of the predetermined portion of the assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the assembly prior to the radial expansion and plastic deformation.

556. The assembly of claim 516, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.

557. The assembly of claim 516, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.

558. The assembly of claim 516, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.

559. The assembly of claim 516, wherein the anisotropy of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

560. The assembly of claim 516, wherein the yield point of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, ranges from about 47.6 ksi to about 61.7 ksi.

561. The assembly of claim 516, wherein the expandability coefficient of the predetermined portion of the assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.

562. The assembly of claim 516, wherein the expandability coefficient of the predetermined portion of the assembly is greater than the expandability coefficient of the other portion of the assembly.

563. The assembly of claim 516, wherein the assembly comprises a wellbore casing.

564. The assembly of claim 516, wherein the assembly comprises a pipeline.

565. The assembly of claim 516, wherein the assembly comprises a structural support.

566. The assembly of claim 516, wherein the annulus is at least partially defined by an irregular surface.

567. The assembly of claim 516, wherein the annulus is at least partially defined by a toothed surface.

568. The assembly of claim 516, wherein the sealing element comprises an elastomeric material.

569. The assembly of claim 516, wherein the sealing element comprises a metallic material.

570. The assembly of claim 516, wherein the sealing element comprises an elastomeric and a metallic material.

571. A method of joining radially expandable tubular members comprising:
providing a first tubular member;
providing a second tubular member;
providing a sleeve;
mounting the sleeve for overlapping and coupling the first and second tubular members;
threadably coupling the first and second tubular members at a first location;
threadably coupling the first and second tubular members at a second location spaced apart from the first location;
sealing an interface between the first and second tubular members between the first and second locations using a compressible sealing element, wherein the first tubular member, second tubular member, sleeve, and the sealing element define a tubular assembly; and
radially expanding and plastically deforming the tubular assembly;
wherein, prior to the radial expansion and plastic deformation, a predetermined portion of the tubular assembly has a lower yield point than another portion of

the tubular assembly.

572. The method as defined in claim 571 wherein the sealing element includes an irregular surface.

573. The method as defined in claim 571, wherein the sealing element includes a toothed surface.

574. The method as defined in claim 571, wherein the sealing element comprises an elastomeric material.

575. The method as defined in claim 571, wherein the sealing element comprises a metallic material.

576. The method as defined in claim 571, wherein the sealing element comprises an elastomeric and a metallic material.

577. The method of claim 571, wherein the predetermined portion of the tubular assembly has a higher ductility and a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

578. The method of claim 571, wherein the predetermined portion of the tubular assembly has a higher ductility prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

579. The method of claim 571, wherein the predetermined portion of the tubular assembly has a lower yield point prior to the radial expansion and plastic deformation than after the radial expansion and plastic deformation.

580. The method of claim 571, wherein the predetermined portion of the tubular assembly has a larger inside diameter after the radial expansion and plastic deformation than the other portion of the tubular assembly.

581. The method of claim 571, further comprising:
positioning another tubular assembly within the preexisting structure in overlapping relation to the tubular assembly; and
radially expanding and plastically deforming the other tubular assembly within the

preexisting structure;

wherein, prior to the radial expansion and plastic deformation of the tubular assembly, a predetermined portion of the other tubular assembly has a lower yield point than another portion of the other tubular assembly.

582. The method of claim 581, wherein the inside diameter of the radially expanded and plastically deformed other portion of the tubular assembly is equal to the inside diameter of the radially expanded and plastically deformed other portion of the other tubular assembly.

583. The method of claim 571, wherein the predetermined portion of the tubular assembly comprises an end portion of the tubular assembly.

584. The method of claim 571, wherein the predetermined portion of the tubular assembly comprises a plurality of predetermined portions of the tubular assembly.

585. The method of claim 571, wherein the predetermined portion of the tubular assembly comprises a plurality of spaced apart predetermined portions of the tubular assembly.

586. The method of claim 571, wherein the other portion of the tubular assembly comprises an end portion of the tubular assembly.

587. The method of claim 571, wherein the other portion of the tubular assembly comprises a plurality of other portions of the tubular assembly.

588. The method of claim 571, wherein the other portion of the tubular assembly comprises a plurality of spaced apart other portions of the tubular assembly.

589. The method of claim 571, wherein the tubular assembly comprises a plurality of tubular members coupled to one another by corresponding tubular couplings.

590. The method of claim 589, wherein the tubular couplings comprise the predetermined portions of the tubular assembly; and wherein the tubular members comprise the other portion of the tubular assembly.

591. The method of claim 589, wherein one or more of the tubular couplings comprise the predetermined portions of the tubular assembly.

592. The method of claim 589, wherein one or more of the tubular members comprise the predetermined portions of the tubular assembly.

593. The method of claim 571, wherein the predetermined portion of the tubular assembly defines one or more openings.

594. The method of claim 593, wherein one or more of the openings comprise slots.

595. The method of claim 593, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

596. The method of claim 571, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1.

597. The method of claim 571, wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

598. The method of claim 571, wherein the anisotropy for the predetermined portion of the tubular assembly is greater than 1; and wherein the strain hardening exponent for the predetermined portion of the tubular assembly is greater than 0.12.

599. The method of claim 571, wherein the predetermined portion of the tubular assembly comprises a first steel alloy comprising: 0.065 % C, 1.44 % Mn, 0.01 % P, 0.002 % S, 0.24 % Si, 0.01 % Cu, 0.01 % Ni, and 0.02 % Cr.

600. The method of claim 599, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

601. The method of claim 599, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

602. The method of claim 599, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.48.

603. The method of claim 571, wherein the predetermined portion of the tubular assembly comprises a second steel alloy comprising: 0.18 % C, 1.28 % Mn, 0.017 % P, 0.004 % S, 0.29 % Si, 0.01 % Cu, 0.01 % Ni, and 0.03 % Cr.

604. The method of claim 603, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

605. The method of claim 603, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

606. The method of claim 603, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.04.

607. The method of claim 571, wherein the predetermined portion of the tubular assembly comprises a third steel alloy comprising: 0.08 % C, 0.82 % Mn, 0.006 % P, 0.003 % S, 0.30 % Si, 0.16 % Cu, 0.05 % Ni, and 0.05 % Cr.

608. The method of claim 607, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.92.

609. The method of claim 571, wherein the predetermined portion of the tubular assembly comprises a fourth steel alloy comprising: 0.02 % C, 1.31 % Mn, 0.02 % P, 0.001 % S, 0.45 % Si, 9.1 % Ni, and 18.7 % Cr.

610. The method of claim 609, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is about 1.34.

611. The method of claim 571, wherein the yield point of the predetermined portion of the tubular assembly is at most about 46.9 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 65.9 ksi after the radial expansion and plastic deformation.

612. The method of claim 571, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 40 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

613. The method of claim 571, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.48.

614. The method of claim 571, wherein the yield point of the predetermined portion of the tubular assembly is at most about 57.8 ksi prior to the radial expansion and plastic deformation; and wherein the yield point of the predetermined portion of the tubular assembly is at least about 74.4 ksi after the radial expansion and plastic deformation.

615. The method of claim 571, wherein the yield point of the predetermined portion of the tubular assembly after the radial expansion and plastic deformation is at least about 28 % greater than the yield point of the predetermined portion of the tubular assembly prior to the radial expansion and plastic deformation.

616. The method of claim 571, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.04.

617. The method of claim 571, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.92.

618. The method of claim 571, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is at least about 1.34.

619. The method of claim 571, wherein the anisotropy of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about 1.04 to about 1.92.

620. The method of claim 571, wherein the yield point of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, ranges from about

47.6 ksi to about 61.7 ksi.

621. The method of claim 571, wherein the expandability coefficient of the predetermined portion of the tubular assembly, prior to the radial expansion and plastic deformation, is greater than 0.12.

622. The method of claim 571, wherein the expandability coefficient of the predetermined portion of the tubular assembly is greater than the expandability coefficient of the other portion of the tubular assembly.

623. The method of claim 571, wherein the tubular assembly comprises a wellbore casing.

624. The method of claim 571, wherein the tubular assembly comprises a pipeline.

625. The method of claim 571, wherein the tubular assembly comprises a structural support.

626. The apparatus of claim 205, wherein the sleeve comprises:
a plurality of spaced apart tubular sleeves coupled to and receiving end portions of the first and second tubular members.

627. The apparatus of claim 626, wherein the first tubular member comprises a first threaded connection; wherein the second tubular member comprises a second threaded connection; wherein the first and second threaded connections are coupled to one another; wherein at least one of the tubular sleeves is positioned in opposing relation to the first threaded connection; and wherein at least one of the tubular sleeves is positioned in opposing relation to the second threaded connection.

628. The apparatus of claim 626, wherein the first tubular member comprises a first threaded connection; wherein the second tubular member comprises a second threaded connection; wherein the first and second threaded connections are coupled to one another; and wherein at least one of the tubular sleeves is not positioned in opposing relation to the first and second threaded connections.

629. The method of claim 310, further comprising:
threadably coupling the first and second tubular members at a first location;

threadably coupling the first and second tubular members at a second location spaced apart from the first location;
providing a plurality of sleeves; and
mounting the sleeves at spaced apart locations for overlapping and coupling the first and second tubular members.

630. The method of claim 629, wherein at least one of the tubular sleeves is positioned in opposing relation to the first threaded coupling; and wherein at least one of the tubular sleeves is positioned in opposing relation to the second threaded coupling.

631. The method of claim 629, wherein at least one of the tubular sleeves is not positioned in opposing relation to the first and second threaded couplings.

632. The apparatus of claim 205, further comprising:
a threaded connection for coupling a portion of the first and second tubular members;
wherein at least a portion of the threaded connection is upset.

633. The apparatus of claim 632, wherein at least a portion of tubular sleeve penetrates the first tubular member.

634. The method of claim 310, further comprising:
threadably coupling the first and second tubular members; and
upsetting the threaded coupling.

635. The apparatus of claim 205, wherein the first tubular member further comprises an annular extension extending therefrom; and wherein the flange of the sleeve defines an annular recess for receiving and mating with the annular extension of the first tubular member.

636. The method of claim 310, wherein the first tubular member further comprises an annular extension extending therefrom; and wherein the flange of the sleeve defines an annular recess for receiving and mating with the annular extension of the first tubular member.

637. The apparatus of claim 205, further comprising:
one or more stress concentrators for concentrating stresses in the joint.

638. The apparatus as defined in claim 637, wherein one or more of the stress concentrators comprises one or more external grooves defined in the first tubular member.

639. The apparatus as defined in claim 637, wherein one or more of the stress concentrators comprises one or more internal grooves defined in the second tubular member.

640. The apparatus as defined in claim 637, wherein one or more of the stress concentrators comprises one or more openings defined in the sleeve.

641. The apparatus as defined in claim 637, wherein one or more of the stress concentrators comprises one or more external grooves defined in the first tubular member; and wherein one or more of the stress concentrators comprises one or more internal grooves defined in the second tubular member.

642. The apparatus as defined in claim 637, wherein one or more of the stress concentrators comprises one or more external grooves defined in the first tubular member; and wherein one or more of the stress concentrators comprises one or more openings defined in the sleeve.

643. The apparatus as defined in claim 637, wherein one or more of the stress concentrators comprises one or more internal grooves defined in the second tubular member; and wherein one or more of the stress concentrators comprises one or more openings defined in the sleeve.

644. The apparatus as defined in claim 637, wherein one or more of the stress concentrators comprises one or more external grooves defined in the first tubular member; wherein one or more of the stress concentrators comprises one or more internal grooves defined in the second tubular member; and wherein one or more of the stress concentrators comprises one or more openings defined in the sleeve.

645. The method of claim 310, further comprising:
concentrating stresses within the joint.

646. The method as defined in claim 645, wherein concentrating stresses within the joint comprises using the first tubular member to concentrate stresses within the joint.

647. The method as defined in claim 645, wherein concentrating stresses within the joint comprises using the second tubular member to concentrate stresses within the joint.

648. The method as defined in claim 645, wherein concentrating stresses within the joint comprises using the sleeve to concentrate stresses within the joint.

649. The method as defined in claim 645, wherein concentrating stresses within the joint comprises using the first tubular member and the second tubular member to concentrate stresses within the joint.

650. The method as defined in claim 645, wherein concentrating stresses within the joint comprises using the first tubular member and the sleeve to concentrate stresses within the joint.

651. The method as defined in claim 645, wherein concentrating stresses within the joint comprises using the second tubular member and the sleeve to concentrate stresses within the joint.

652. The method as defined in claim 645, wherein concentrating stresses within the joint comprises using the first tubular member, the second tubular member, and the sleeve to concentrate stresses within the joint.

653. The apparatus of claim 205, further comprising:
means for maintaining portions of the first and second tubular member in circumferential compression following the radial expansion and plastic deformation of the first and second tubular members.

654. The apparatus of claim 205, further comprising:
means for concentrating stresses within the mechanical connection during the radial expansion and plastic deformation of the first and second tubular members.

655. The apparatus of claim 205, further comprising:
means for maintaining portions of the first and second tubular member in circumferential compression following the radial expansion and plastic deformation of the first and second tubular members; and

means for concentrating stresses within the mechanical connection during the radial expansion and plastic deformation of the first and second tubular members.

656. The method of claim 310, further comprising:
maintaining portions of the first and second tubular member in circumferential compression following a radial expansion and plastic deformation of the first and second tubular members.

657. The method of claim 310, further comprising:
concentrating stresses within the joint during a radial expansion and plastic deformation of the first and second tubular members.

658. The method of claim 310, further comprising:
maintaining portions of the first and second tubular member in circumferential compression following a radial expansion and plastic deformation of the first and second tubular members; and
concentrating stresses within the joint during a radial expansion and plastic deformation of the first and second tubular members.

659. The method of claim 1, wherein the carbon content of the predetermined portion of the tubular assembly is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.21.

660. The method of claim 1, wherein the carbon content of the predetermined portion of the tubular assembly is greater than 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.36.

661. An expandable tubular member, wherein the carbon content of the tubular member is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the tubular member is less than 0.21.

662. The tubular member of claim 661, wherein the tubular member comprises a wellbore casing.

663. An expandable tubular member, wherein the carbon content of the tubular member is greater than 0.12 percent; and wherein the carbon equivalent value for the tubular member is less than 0.36.

664. The tubular member of claim 663, wherein the tubular member comprises a wellbore casing.

665. The apparatus of claim 142, wherein the carbon content of the predetermined portion of the tubular assembly is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.21.

666. The apparatus of claim 142, wherein the carbon content of the predetermined portion of the tubular assembly is greater than 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.36.

667. A method of selecting tubular members for radial expansion and plastic deformation, comprising:
selecting a tubular member from a collection of tubular member;
determining a carbon content of the selected tubular member;
determining a carbon equivalent value for the selected tubular member; and
if the carbon content of the selected tubular member is less than or equal to 0.12 percent and the carbon equivalent value for the selected tubular member is less than 0.21, then determining that the selected tubular member is suitable for radial expansion and plastic deformation.

668. A method of selecting tubular members for radial expansion and plastic deformation, comprising:
selecting a tubular member from a collection of tubular member;
determining a carbon content of the selected tubular member;
determining a carbon equivalent value for the selected tubular member; and
if the carbon content of the selected tubular member is greater than 0.12 percent and the carbon equivalent value for the selected tubular member is less than 0.36, then determining that the selected tubular member is suitable for radial expansion and plastic deformation.

669. The apparatus of claim 205, wherein the carbon content of the predetermined portion of the apparatus is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the apparatus is less than 0.21.

670. The apparatus of claim 205, wherein the carbon content of the predetermined portion of the apparatus is greater than 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the apparatus is less than 0.36.

671. The method of claim 310, wherein the carbon content of the predetermined portion of the tubular assembly is less than or equal to 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.21.

672. The method of claim 310, wherein the carbon content of the predetermined portion of the tubular assembly is greater than 0.12 percent; and wherein the carbon equivalent value for the predetermined portion of the tubular assembly is less than 0.36.

673. An expandable tubular member, comprising:

a tubular body;

wherein a yield point of an inner tubular portion of the tubular body is less than a yield point of an outer tubular portion of the tubular body.

674. The expandable tubular member of claim 673, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body.

675. The expandable tubular member of claim 674, wherein the yield point of the inner tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

676. The expandable tubular member of claim 674, wherein the yield point of the inner tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

677. The expandable tubular member of claim 673, wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

678. The expandable tubular member of claim 677, wherein the yield point of the outer tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

679. The expandable tubular member of claim 677, wherein the yield point of the outer tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

680. The expandable tubular member of claim 673,
wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body; and
wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

681. The expandable tubular member of claim 680, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

682. The expandable tubular member of claim 680, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

683. The expandable tubular member of claim 680, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

684. The expandable tubular member of claim 680, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

685. The expandable tubular member of claim 680, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

686. The expandable tubular member of claim 680, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

687. The method of claim 1, wherein a yield point of an inner tubular portion of at least a portion of the tubular assembly is less than a yield point of an outer tubular portion of the portion of the tubular assembly.

688. The method of claim 687, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body.

689. The method of claim 688, wherein the yield point of the inner tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

690. The method of claim 688, wherein the yield point of the inner tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

691. The method of claim 687, wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

692. The method of claim 691, wherein the yield point of the outer tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

693. The method of claim 691, wherein the yield point of the outer tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

694. The method of claim 687, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

695. The method of claim 694, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

696. The method of claim 694, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

697. The method of claim 694, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

698. The method of claim 694, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

699. The method of claim 694, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

700. The method of claim 694, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

701. The apparatus of claim 142, wherein a yield point of an inner tubular portion of at least a portion of the tubular assembly is less than a yield point of an outer tubular portion of the portion of the tubular assembly.

702. The apparatus of claim 701, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body.

703. The apparatus of claim 702, wherein the yield point of the inner tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

704. The apparatus of claim 702, wherein the yield point of the inner tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

705. The apparatus of claim 701, wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

706. The apparatus of claim 705, wherein the yield point of the outer tubular portion of the tubular body varies in an linear fashion as a function of the radial position within the tubular body.

707. The apparatus of claim 705, wherein the yield point of the outer tubular portion of the tubular body varies in an non-linear fashion as a function of the radial position within the tubular body.

708. The apparatus of claim 701, wherein the yield point of the inner tubular portion of the tubular body varies as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies as a function of the radial position within the tubular body.

709. The apparatus of claim 708, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

710. The apparatus of claim 708, wherein the yield point of the inner tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

711. The apparatus of claim 708, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the

tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a linear fashion as a function of the radial position within the tubular body.

712. The apparatus of claim 708, wherein the yield point of the inner tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body; and wherein the yield point of the outer tubular portion of the tubular body varies in a non-linear fashion as a function of the radial position within the tubular body.

713. The apparatus of claim 708, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

714. The apparatus of claim 708, wherein the rate of change of the yield point of the inner tubular portion of the tubular body is different than the rate of change of the yield point of the outer tubular portion of the tubular body.

715. The method of claim 1, wherein prior to the radial expansion and plastic deformation, at least a portion of the tubular assembly comprises a microstructure comprising a hard phase structure and a soft phase structure.

716. The method of claim 715, wherein prior to the radial expansion and plastic deformation, at least a portion of the tubular assembly comprises a microstructure comprising a transitional phase structure.

717. The method of claim 715, wherein the hard phase structure comprises martensite.

718. The method of claim 715, wherein the soft phase structure comprises ferrite.

719. The method of claim 715, wherein the transitional phase structure comprises retained austentite.

720. The method of claim 715, wherein the hard phase structure comprises martensite; wherein the soft phase structure comprises ferrite; and wherein the transitional phase structure comprises retained austentite.

721. The method of claim 715, wherein the portion of the tubular assembly comprising a microstructure comprising a hard phase structure and a soft phase structure comprises, by weight percentage, about 0.1% C, about 1.2% Mn, and about 0.3% Si.

722. The apparatus of claim 142, wherein at least a portion of the tubular assembly comprises a microstructure comprising a hard phase structure and a soft phase structure.

723. The apparatus of claim 722, wherein prior to the radial expansion and plastic deformation, at least a portion of the tubular assembly comprises a microstructure comprising a transitional phase structure.

724. The apparatus of claim 722, wherein the hard phase structure comprises martensite.

725. The apparatus of claim 722, wherein the soft phase structure comprises ferrite.

726. The apparatus of claim 722, wherein the transitional phase structure comprises retained austentite.

727. The apparatus of claim 722, wherein the hard phase structure comprises martensite; wherein the soft phase structure comprises ferrite; and wherein the transitional phase structure comprises retained austentite.

728. The apparatus of claim 722, wherein the portion of the tubular assembly comprising a microstructure comprising a hard phase structure and a soft phase structure comprises, by weight percentage, about 0.1% C, about 1.2% Mn, and about 0.3% Si.

729. A method of manufacturing an expandable tubular member, comprising:
providing a tubular member;
heat treating the tubular member; and
quenching the tubular member;
wherein following the quenching, the tubular member comprises a microstructure comprising a hard phase structure and a soft phase structure.

730. The method of claim 729, wherein the provided tubular member comprises, by weight percentage, 0.065% C, 1.44% Mn, 0.01% P, 0.002% S, 0.24% Si, 0.01% Cu, 0.01% Ni, 0.02% Cr, 0.05% V, 0.01% Mo, 0.01% Nb, and 0.01%Ti.

731. The method of claim 729, wherein the provided tubular member comprises, by weight percentage, 0.18% C, 1.28% Mn, 0.017% P, 0.004% S, 0.29% Si, 0.01% Cu, 0.01% Ni, 0.03% Cr, 0.04% V, 0.01% Mo, 0.03% Nb, and 0.01%Ti.

732. The method of claim 729, wherein the provided tubular member comprises, by weight percentage, 0.08% C, 0.82% Mn, 0.006% P, 0.003% S, 0.30% Si, 0.06% Cu, 0.05% Ni, 0.05% Cr, 0.03% V, 0.03% Mo, 0.01% Nb, and 0.01%Ti.

733. The method of claim 729, wherein the provided tubular member comprises a microstructure comprising one or more of the following: martensite, pearlite, vanadium carbide, nickel carbide, or titanium carbide.

734. The method of claim 729, wherein the provided tubular member comprises a microstructure comprising one or more of the following: pearlite or pearlite striation.

735. The method of claim 729, wherein the provided tubular member comprises a microstructure comprising one or more of the following: grain pearlite, widmanstatten martensite, vanadium carbide, nickel carbide, or titanium carbide.

736. The method of claim 729, wherein the heat treating comprises heating the provided tubular member for about 10 minutes at 790 °C.

737. The method of claim 729, wherein the quenching comprises quenching the heat treated tubular member in water.

738. The method of claim 729, wherein following the quenching, the tubular member comprises a microstructure comprising one or more of the following: ferrite, grain pearlite, or martensite.

739. The method of claim 729, wherein following the quenching, the tubular member comprises a microstructure comprising one or more of the following: ferrite, martensite, or bainite.

740. The method of claim 729, wherein following the quenching, the tubular member comprises a microstructure comprising one or more of the following: bainite, pearlite, or ferrite.

741. The method of claim 729, wherein following the quenching, the tubular member comprises a yield strength of about 67ksi and a tensile strength of about 95 ksi.

742. The method of claim 729, wherein following the quenching, the tubular member comprises a yield strength of about 82 ksi and a tensile strength of about 130 ksi.

743. The method of claim 729, wherein following the quenching, the tubular member comprises a yield strength of about 60 ksi and a tensile strength of about 97 ksi.

744. The method of claim 729, further comprising:
positioning the quenched tubular member within a preexisting structure; and
radially expanding and plastically deforming the tubular member within the preexisting structure.

745. The apparatus of claim 142, wherein at least a portion of the tubular assembly comprises a microstructure comprising a hard phase structure and a soft phase structure.

746. The apparatus of claim 745, wherein the portion of the tubular assembly comprises, by weight percentage, 0.065% C, 1.44% Mn, 0.01% P, 0.002% S, 0.24% Si, 0.01% Cu, 0.01% Ni, 0.02% Cr, 0.05% V, 0.01% Mo, 0.01% Nb, and 0.01%Ti.

747. The apparatus of claim 745, wherein the portion of the tubular assembly comprises, by weight percentage, 0.18% C, 1.28% Mn, 0.017% P, 0.004% S, 0.29% Si, 0.01% Cu, 0.01% Ni, 0.03% Cr, 0.04% V, 0.01% Mo, 0.03% Nb, and 0.01%Ti.

748. The apparatus of claim 745, wherein the portion of the tubular assembly comprises, by weight percentage, 0.08% C, 0.82% Mn, 0.006% P, 0.003% S, 0.30% Si, 0.06% Cu, 0.05% Ni, 0.05% Cr, 0.03% V, 0.03% Mo, 0.01% Nb, and 0.01%Ti.

749. The apparatus of claim 745, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: martensite, pearlite, vanadium carbide, nickel carbide, or titanium carbide.

750. The apparatus of claim 745, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: pearlite or pearlite striation.

751. The apparatus of claim 745, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: grain pearlite, widmanstatten martensite, vanadium carbide, nickel carbide, or titanium carbide.

752. The apparatus of claim 745, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: ferrite, grain pearlite, or martensite.

753. The apparatus of claim 745, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: ferrite, martensite, or bainite.

754. The apparatus of claim 745, wherein the portion of the tubular assembly comprises a microstructure comprising one or more of the following: bainite, pearlite, or ferrite.

755. The apparatus of claim 745, wherein the portion of the tubular assembly comprises a yield strength of about 67ksi and a tensile strength of about 95 ksi.

756. The apparatus of claim 745, wherein the portion of the tubular assembly comprises a yield strength of about 82 ksi and a tensile strength of about 130 ksi.

757. The apparatus of claim 745, wherein the portion of the tubular assembly comprises a yield strength of about 60 ksi and a tensile strength of about 97 ksi.

758. A system for radially expanding and plastically deforming a tubular member, comprising:

an expansion device positioned in the tubular member; and

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

759. The system of claim 758, wherein the coefficient of friction is in the range of .02 to 0.05.

760. The system of claim 758, additionally comprising:

lubricant between the tubular member and the expansion device.

761. The system of claim 760, wherein the lubricant comprises oil based.

762. The system of claim 760, wherein the lubricant comprises H1 oil.

763. The system of claim 760, wherein the lubricant comprises H2 oil.

764. The system of claim 760, wherein the lubricant comprises H3 oil.

765. The system of claim 760, wherein the lubricant comprises H4 oil.

766. The system of claim 760, wherein the lubricant comprises H5 oil.

767. The system of claim 760, wherein the lubricant comprises H6 oil.

768. The system of claim 760, wherein the lubricant comprises H7 oil.

769. The system of claim 760, wherein the lubricant comprises grease.

770. The system of claim 760, wherein the lubricant comprises water based.

771. The system of claim 760, wherein the lubricant comprises drilling mud.

772. The system of claim 760, wherein the lubricant comprises drilling mud.

773. The system of claim 760, wherein the lubricant comprises drilling mud and solid lubricants.

774. The system of claim 760, wherein the lubricant comprises grease combined with a solid lubricant.

775. The system of claim 760, wherein the lubricant comprises at least 10% Graphite.

776. The system of claim 760, wherein the lubricant comprises at least 10% Molybdenum Disulfide.

777. The system of claim 758, additionally comprising:
a coating on the expansion device.

778. The system of claim 777, wherein the coating comprises Phygen film.

779. The system of claim 758, additionally comprising:
a coating on the tubular member.

780. The system of claim 779, wherein the coating comprises PTFE.

781. The system of claim 779, wherein the coating comprises PTFE based.

782. The system of claim 779, wherein the coating comprises graphite based.

783. The system of claim 758, wherein the expansion device comprises DC53 material.

784. The system of claim 758, wherein the expansion device comprises DC2 material.

785. The system of claim 758, wherein the expansion device comprises DC3 material.

786. The system of claim 758, wherein the expansion device comprises DC5 material.

787. The system of claim 758, wherein the expansion device comprises DC7 material.

788. The system of claim 758, wherein the expansion device comprises M2 material.

789. The system of claim 758, wherein the expansion device comprises CPM M4 material.

790. The system of claim 758, wherein the expansion device comprises 10V material.

791. The system of claim 758, wherein the expansion device comprises 3V material.

792. The system of claim 758, wherein the expansion device comprises an REM finish.

793. The system of claim 758, wherein the expansion device comprises a processed finish.

794. The system of claim 758, wherein the expansion device comprises a relatively smooth surface roughness.

795. The system of claim 758, wherein the expansion device has a relatively smooth surface roughness and includes relatively evenly space oil pockets.

796. The system of claim 758, wherein the expansion device has a smooth surface roughness in the range of 0.02 to 0.1 micrometers

797. The system of claim 758, wherein lubricant is injected through at least a portion of the expansion device between the tubular member and the expansion device.

798. The system of claim 758, wherein lubricant is injected through at least a portion of the expansion device between the tubular member and the expansion device when a predetermined pressure is met.

799. The system of claim 758, wherein lubricant is injected through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

800. The system of claim 758, wherein the expansion device comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 30 degrees.

801. The system of claim 758, wherein the expansion device comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 10 degrees.

802. The system of claim 758, additionally comprising
lubricant between the tubular member and the expansion device, comprising at least nine components selected from the group consisting of:

a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

803. The system of claim 758, wherein the expansion device comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

804. The system of claim 758, wherein the tubular member has a non-uniform wall thickness and the expansion device comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

805. The system of claim 758, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

806. The system of claim 758, wherein the tubular member comprises a wellbore casing.

807. The system of claim 758, wherein the tubular member comprises a pipeline.

808. The system of claim 758, wherein the tubular member comprises a structural support.

809. The system of claim 758, wherein the expansion device comprises an expansion cone.

810. A method of radially expanding and plastically deforming a tubular member, comprising:
positioning an expansion device having a first tapered end and a second end at least partially within the tubular member;
displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and
wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

811. The method of claim 810, wherein the coefficient of friction is in the range of .02 to 0.05.

812. The method of claim 810, additionally comprising:
injecting lubricant between the tubular member and the expansion device.

813. The method of claim 812, wherein the lubricant comprises oil based.

814. The method of claim 812, wherein the lubricant comprises H1 oil.

815. The method of claim 812, wherein the lubricant comprises H2 oil.

816. The method of claim 812, wherein the lubricant comprises H3 oil.

817. The method of claim 812, wherein the lubricant comprises H4 oil.

818. The method of claim 812, wherein the lubricant comprises H5 oil.

819. The method of claim 812, wherein the lubricant comprises H6 oil.

820. The method of claim 812, wherein the lubricant comprises H7 oil.

821. The method of claim 812, wherein the lubricant comprises grease.

822. The method of claim 812, wherein the lubricant comprises water based.

823. The method of claim 812, wherein the lubricant comprises drilling mud.

824. The method of claim 812, wherein the lubricant comprises drilling mud.

825. The method of claim 812, wherein the lubricant comprises drilling mud and solid lubricants.

826. The method of claim 812, wherein the lubricant comprises grease combined with a solid lubricant.

827. The method of claim 812, wherein the lubricant includes at least 10% Graphite.

828. The method of claim 812, wherein the lubricant includes at least 10% Molybdenum Disulfide.

829. The method of claim 810, additionally comprising
applying a coating on the expansion device prior to positioning within the tubular member.

830. The method of claim 829, wherein the coating comprises Phygen film.

831. The method of claim 810, additionally comprising
applying a coating on the tubular member prior to positioning the expansion device within the tubular member.

832. The method of claim 831, wherein the coating comprises PTFE.

833. The method of claim 831, wherein the coating comprises PTFE based.

834. The method of claim 831, wherein the coating comprises graphite based.

835. The method of claim 810, wherein the expansion device comprises DC53 material.

836. The method of claim 810, wherein the expansion device comprises DC2 material.

837. The method of claim 810, wherein the expansion device comprises DC3 material.

838. The method of claim 810, wherein the expansion device comprises DC5 material.

839. The method of claim 810, wherein the expansion device comprises DC7 material.

840. The method of claim 810, wherein the expansion device comprises M2 material.

841. The method of claim 810, wherein the expansion device comprises CPM M4 material.

842. The method of claim 810, wherein the expansion device comprises 10V material.

843. The method of claim 810, wherein the expansion device comprises 3V material.

844. The method of claim 810, wherein the expansion device has an REM finish.

845. The method of claim 810, wherein the expansion device has a processed finish.

846. The method of claim 810, wherein the expansion device has a relatively smooth surface roughness.

847. The method of claim 810, wherein the expansion device has a relatively smooth surface roughness and includes relatively evenly space oil pockets.

848. The method of claim 810, wherein the expansion device has a smooth surface roughness in the range of 0.02 to 0.1 micrometers

849. The method of claim 810, additionally comprising:
injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device.

850. The method of claim 810, additionally comprising:
injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device when a predetermined pressure is met.

851. The method of claim 810, additionally comprising:
injecting lubricant through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

852. The method of claim 810, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 30 degrees.

853. The method of claim 810, wherein the expansion device, comprises:

a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 10 degrees.

854. The method of claim 810, additionally comprising
injecting lubricant between the tubular member and the expansion device, comprising at least nine components selected from the group consisting of:
a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

855. The method of claim 810, wherein the expansion device, comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

856. The method of claim 810, wherein the tubular member has a non-uniform wall thickness and the expansion device comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

857. The method of claim 810, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device; additionally comprising:
charging the capacitor;
discharging the capacitor through the electrodes; and
injecting the lubricant through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

858. The method of claim 810, wherein the tubular member comprises a wellbore casing.

859. The method of claim 810, wherein the tubular member comprises a pipeline.

860. The method of claim 810, wherein the tubular member comprises a structural support.

861. The method of claim 810, wherein the expansion device comprises an expansion cone.

862. A system for radially expanding and plastically deforming a tubular member, comprising:

means for positioning an expansion device having a first tapered end and a second end at least partially within the tubular member; and

means for displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member;

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

863. The system of claim 862, wherein the coefficient of friction is in the range of .02 to 0.05.

864. The system of claim 862, additionally comprising

means for injecting lubricant between the tubular member and the expansion device.

865. The system of claim 864, wherein the lubricant comprises oil based.

866. The system of claim 864, wherein the lubricant comprises H1 oil.

867. The system of claim 864, wherein the lubricant comprises H2 oil.

868. The system of claim 864, wherein the lubricant comprises H3 oil.

869. The system of claim 864, wherein the lubricant comprises H4 oil.

870. The system of claim 864, wherein the lubricant comprises H5 oil.

871. The system of claim 864, wherein the lubricant comprises H6 oil.

872. The system of claim 864, wherein the lubricant comprises H7 oil.

873. The system of claim 864, wherein the lubricant comprises grease.

874. The system of claim 864, wherein the lubricant comprises water based.

875. The system of claim 864, wherein the lubricant comprises drilling mud.

876. The system of claim 864, wherein the lubricant comprises drilling mud.

877. The system of claim 864, wherein the lubricant comprises drilling mud and solid lubricants.

878. The system of claim 864, wherein the lubricant comprises grease combined with a solid lubricant.

879. The system of claim 864, wherein the lubricant includes at least 10% Graphite.

880. The system of claim 864, wherein the lubricant includes at least 10% Molybdenum Disulfide.

881. The system of claim 862, additionally comprising
means for applying a coating on the expansion device prior to positioning within the tubular member.

882. The system of claim 828, wherein the coating comprises Phygen film.

883. The system of claim 862, additionally comprising
means for applying a coating on the tubular member prior to positioning the expansion device within the tubular member.

884. The system of claim 883, wherein the coating comprises PTFE.

885. The system of claim 883, wherein the coating comprises PTFE based.

886. The system of claim 883, wherein the coating comprises graphite based. .

887. The system of claim 862, wherein the expansion device comprises DC53 material.

888. The system of claim 862, wherein the expansion device comprises DC2 material.

889. The system of claim 862, wherein the expansion device comprises DC3 material.

890. The system of claim 862, wherein the expansion device comprises DC5 material.

891. The system of claim 862, wherein the expansion device comprises DC7 material.

892. The system of claim 862, wherein the expansion device comprises M2 material.

893. The system of claim 862, wherein the expansion device comprises CPM M4 material.

894. The system of claim 862, wherein the expansion device comprises 10V material.

895. The system of claim 862, wherein the expansion device comprises 3V material.

896. The system of claim 862, wherein the expansion device comprises an REM finish.

897. The system of claim 862, wherein the expansion device comprises a processed finish.

898. The system of claim 862, wherein the expansion device comprises a relatively smooth surface roughness.

899. The system of claim 862, wherein the expansion device comprises a relatively smooth surface roughness and includes relatively evenly space oil pockets.

900. The system of claim 862, wherein the expansion device comprises a smooth surface roughness in the range of 0.02 to 0.1 micrometers

901. The system of claim 862, additionally comprising:
means for injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device.

902. The system of claim 862, additionally comprising:
means for injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device when a predetermined pressure is met.

903. The system of claim 862, additionally comprising:

means for injecting lubricant through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

904. The system of claim 862, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 30 degrees.

905. The system of claim 862, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 10 degrees.

906. The system of claim 862, additionally comprising
means for injecting lubricant between the tubular member and the expansion device, comprising at least nine components selected from the group consisting of:
a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

907. The system of claim 862, wherein the expansion device, comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

908. The system of claim 862, wherein the tubular member has a non-uniform wall thickness and the expansion device comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

909. The system of claim 862, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

910. The system of claim 862, wherein the tubular member comprises a wellbore casing.

911. The system of claim 862, wherein the tubular member comprises a pipeline.

912. The system of claim 862, wherein the tubular member comprises a structural support.

913. The system of claim 862, wherein the expansion device comprises an expansion cone.

914. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising at least eight components selected from the group consisting of:

a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

915. The lubricant of claim 914, wherein the lubricant by weight comprises:

64.25 – 90.89% base oil; 0.02 –0.05% metal deactivator; 0.5 – 3.0% antioxidants; 4 - 12% sulfurized natural oils; 4 -12% phosphate ester; 0.4 – 1.5% phosphoric acid; 0.08 – 1.5% viscosity modifier; 0.1 – 0.5% pour-point depressant; 0.01 – 0.2% defoamer; and 0 – 5% carboxylic acid soaps.

916. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising:

77.81% canola oil; 0.04% tolyltriazole; 1.0% phenolic antioxidant; 10% sulfurized natural oil or sulferized lard oil; 9% phosphate ester; 1% phosphoric acid; 0.8% styrene hydrocarbon polymer; 0.3% alkyl ester copolymer; and 0.05% silicon based antifoam agent.

917. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising:

64.25% canola oil; 0.05% tolyltriazole; 1.0% aminic antioxidant; 2.0% phenolic antioxidant, 12% sulfurized natural oil or sulferized lard oil; 12% phosphate ester; 1.5% phosphoric acid; 1.5% styrene hydrocarbon polymer; 0.5% alkyl ester copolymer; 0.2% silicon based antifoam agent., and 5% carbozylic acid soap.

918. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising:

90.89% canola oil; 0.02% tolyltriazole; 0.5% phenolic antioxidant; 4% sulfurized natural oil or sulferized lard oil; 4% phosphate ester; 0.4% phosphoric acid; 0.08% styrene hydrocarbon polymer; 0.1% alkyl ester copolymer; and 0.01% silicon based antifoam agent.

919. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising:

68.71% canola oil; 0.04% tolyltriazole; 0.5% aminic antioxidant, 1.0% phenolic antioxidant; 12% sulfurized natural oil or sulferized lard oil; 10% phosphate ester; 1.1% phosphoric acid; 1.5% styrene hydrocarbon polymer; 0.1% alkyl ester copolymer; 0.05% silicon based antifoam agent., and 5% carbozylic acid soap.

920. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising:

82.07% canola oil; 0.03% tolyltriazole; 0.5% aminic antioxidant, 0.5% phenolic antioxidant; 10% sulfurized natural oil or sulferized lard oil; 5% phosphate ester; 0.5% phosphoric acid; 0.1% styrene hydrocarbon polymer; 0.2% alkyl ester copolymer; 0.1% silicon based antifoam agent., and 1% carbozylic acid soap.

921. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising:

80.68% canola oil; 0.04% tolyltriazole; 1% phenolic antioxidant; 8% sulfurized natural oil or sulferized lard oil; 9% phosphate ester; 1% phosphoric acid; 0.1% styrene hydrocarbon polymer; 0.1% alkyl ester copolymer; and 0.08% silicon based antifoam agent.

922. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising:

80.31% canola oil; 0.04% tolyltriazole; 1.1% phenolic antioxidant; 9% sulfurized natural oil or sulferized lard oil; 8% phosphate ester; 0.8% phosphoric acid; 0.4% styrene hydrocarbon polymer; 0.3% alkyl ester copolymer; and 0.05% silicon based antifoam agent.

923. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising at least 10% Graphite.

924. A lubricant for injecting in an interface between a tubular member and an expansion device, comprising at least 10% Molybedenum Disulfide in a thickener in with a dropping point above 350-400F.

925. An expansion device for radially expanding and plastically deforming the tubular member, comprising:

one or more expansion surfaces on the expansion device for engaging the interior surface of the tubular member during the radial expansion and plastic deformation of the tubular member; and

a lubrication device operably coupled to the expansion surface for injecting lubricant into an interface between the expansion surface and the tubular member during the radial expansion and plastic deformation of the tubular member when a predetermined pressure for lubrication is reached.

926. The expansion device of claim 925, wherein the lubrication device comprises a pump.

927. The expansion device of claim 925, wherein the lubrication device comprises:

a reservoir operably coupled to the expansion surface for house a lubricant;

a means for pressurizing the lubricant; and

a means for injecting the lubricant in the reservoir into the interface when the predetermine pressure is reached.

928. The expansion device of claim 925, wherein the lubrication device comprises:

a reservoir operably coupled to the expansion surface for house a lubricant;

a means for pressurizing the lubricant; and

a valve fluidicly coupled to the reservoir and the expansion surface for injecting the lubricant into the interface when the predetermine pressure is reached.

929. The expansion device of claim 925, wherein the lubrication device comprises:
a reservoir operably coupled to the expansion surface for house a lubricant;
a means for pressurizing the lubricant;
a pressure enhancer operably coupled to the reservoir to increase the pressure on the lubricant in the reservoir; and
a valve fluidicly coupled to the reservoir and the expansion surface for injecting the lubricant into the interface when the predetermine pressure is reached.

930. The expansion device of claim 925, wherein the lubrication device comprises:
a reservoir operably coupled to the expansion surface for house a lubricant;
a means for pressurizing the lubricant;
a piston operably coupled to the reservoir; and
a valve fluidicly coupled to the reservoir and the expansion surface for injecting the lubricant into the interface when the predetermine pressure is reached.

931. The expansion device of claim 925, wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

932. The expansion device of claim 925, wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is in the range of .02 to 0.05.

933. The expansion device of claim 926, wherein the lubricant comprises oil based.

934. The expansion device of claim 926, wherein the lubricant comprises H1 oil.

935. The expansion device of claim 926, wherein the lubricant comprises H2 oil.

936. The expansion device of claim 926, wherein the lubricant comprises H3 oil.

937. The expansion device of claim 926, wherein the lubricant comprises H4 oil.

938. The expansion device of claim 926, wherein the lubricant comprises H5 oil.

938. The expansion device of claim 926, wherein the lubricant comprises H6 oil.

940. The expansion device of claim 926, wherein the lubricant comprises H7 oil.

941. The expansion device of claim 926, wherein the lubricant comprises grease.

942. The expansion device of claim 926, wherein the lubricant comprises water based.

943. The expansion device of claim 926, wherein the lubricant comprises drilling mud.

944. The expansion device of claim 926, wherein the lubricant comprises drilling mud.

945. The expansion device of claim 926, wherein the lubricant comprises drilling mud and solid lubricants.

946. The expansion device of claim 926, wherein the lubricant comprises grease combined with a solid lubricant.

947. The expansion device of claim 926, wherein the lubricant comprises at least 10% Graphite.

948. The expansion device of claim 925, wherein the lubricant comprises at least 10% Molybdenum Disulfide.

949. The expansion device of claim 925, additionally comprising
a coating on the expansion device prior to positioning within the tubular member.

950. The expansion device of claim 925, wherein the coating comprises Phygen film.

951. The expansion device of claim 925, additionally comprising
a coating on the tubular member prior to positioning the expansion device within the tubular member.

952. The expansion device of claim 950, wherein the coating comprises PTFE.

953. The expansion device of claim 950, wherein the coating comprises PTFE based.

954. The expansion device of claim 950, wherein the coating comprises Graphite based. .

955. The expansion device of claim 925, wherein the expansion device comprises DC53 material.

956. The expansion device of claim 925, wherein the expansion device comprises DC2 material.

957. The expansion device of claim 925, wherein the expansion device comprises DC3 material.

958. The expansion device of claim 925, wherein the expansion device comprises DC5 material.

959. The expansion device of claim 925, wherein the expansion device comprises DC7 material.

960. The expansion device of claim 925, wherein the expansion device comprises M2 material.

961. The expansion device of claim 925, wherein the expansion device comprises CPM M4 material.

962. The expansion device of claim 925, wherein the expansion device comprises 10V material.

963. The expansion device of claim 925, wherein the expansion device comprises 3V material.

964. The expansion device of claim 925, wherein the expansion device comprises an REM finish.

965. The expansion device of claim 925, wherein the expansion device comprises a processed finish.

966. The expansion device of claim 925, wherein the expansion device comprises a relatively smooth surface roughness.

967. The expansion device of claim 925, wherein the expansion device comprises a relatively smooth surface roughness and includes relatively evenly space oil pockets.

968. The expansion device of claim 925, wherein the expansion device comprises a smooth surface roughness in the range of 0.02 to 0.1 micrometers

969. The expansion device of claim 925, additionally comprising:
means for injecting lubricant through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

970. The expansion device of claim 925, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 30 degrees and the expansion surfaces are located on the tapered portion.

971. The expansion device of claim 925, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 10 degrees and the expansion surfaces are located on the tapered portion.

972. The expansion device of claim 925, wherein the lubricant comprises at least nine components selected from the group consisting of:

a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

973. The expansion device of claim 925, wherein the expansion device, comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

974. The expansion device of claim 925, wherein the tubular member has a non-uniform wall thickness and the expansion device comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

975. The expansion device of claim 925, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

976. The expansion device of claim 925, wherein the tubular member comprises a wellbore casing.

977. The expansion device of claim 925, wherein the tubular member comprises a pipeline.

978. The expansion device of claim 925, wherein the tubular member comprises a structural support.

979. The expansion device of claim 925, wherein the expansion device comprises an expansion cone.

980. A method for radially expanding and plastically deforming the tubular member, comprising:
positioning an expansion device having one or more expansion surfaces in the interior surface of the tubular member;
displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and
operating a lubrication device to inject lubricant into an interface between the expansion surface and the tubular member when a predetermined lubricant pressure is reached.

981. The method of claim 980, wherein the a lubrication device comprises a pump.

982. The method of claim 980, wherein the lubrication device comprises:
a reservoir operably coupled to the expansion surface for house a lubricant;
a means for pressurizing the lubricant; and
a means for injecting the lubricant in the reservoir into the interface when the predetermine pressure is reached.

983. The method of claim 980, wherein the lubrication device comprises:
a reservoir operably coupled to the expansion surface for house a lubricant;
a means for pressurizing the lubricant; and
a valve fluidicly coupled to the reservoir and the expansion surface for injecting the lubricant into the interface when the predetermine pressure is reached.

984. The method of claim 980, wherein the lubrication device comprises:
a reservoir operably coupled to the expansion surface for house a lubricant;
a means for pressurizing the lubricant;
a pressure enhancer operably coupled to the reservoir to increase the pressure on the lubricant in the reservoir; and
a valve fluidicly coupled to the reservoir and the expansion surface for injecting the lubricant into the interface when the predetermine pressure is reached.

985. The method of claim 980, wherein the lubrication device comprises:
a reservoir operably coupled to the expansion surface for house a lubricant;
a means for pressurizing the lubricant;
a piston operably coupled to the reservoir; and
a valve fluidicly coupled to the reservoir and the expansion surface for injecting the lubricant into the interface when the predetermine pressure is reached.

986. The method of claim 980, wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

987. The method of claim 980, wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is in the range of .02 to 0.05.

988. The method of claim 987, wherein the lubricant comprises oil based.

989. The method of claim 987, wherein the lubricant comprises H1 oil.

990. The method of claim 987, wherein the lubricant comprises H2 oil.

991. The method of claim 987, wherein the lubricant comprises H3 oil.

992. The method of claim 987, wherein the lubricant comprises H4 oil.3.

993. The method of claim 987, wherein the lubricant comprises H5 oil.

994. The method of claim 987, wherein the lubricant comprises H6 oil.

995. The method of claim 987, wherein the lubricant comprises H7 oil.

996. The method of claim 987, wherein the lubricant comprises grease.

997. The method of claim 987, wherein the lubricant comprises water based.

998. The method of claim 987, wherein the lubricant comprises drilling mud.

999. The method of claim 987, wherein the lubricant comprises drilling mud.

1000. The method of claim 987, wherein the lubricant comprises drilling mud and solid lubricants.

1001. The method of claim 987, wherein the lubricant comprises grease combined with a solid lubricant.

1002. The method of claim 987, wherein the lubricant comprises at least 10% Graphite.

1003. The method of claim 980, wherein the lubricant comprises at least 10% Molybdenum Disulfide.

1004. The method of claim 980, additionally comprising

coating on the expansion device prior to positioning within the tubular member.

1005. The method of claim 980, wherein the coating comprises Phygen film.

1006. The method of claim 980, additionally comprising
coating the tubular member prior to positioning the expansion device within the tubular member.

1007. The method of claim 1006, wherein the coating comprises PTFE.

1008. The method of claim 1006, wherein the coating comprises PTFE based.

1009. The method of claim 1006, wherein the coating comprises Graphite based. .

1010. The method of claim 980, wherein the expansion device comprises DC53 material.

1011. The method of claim 980, wherein the expansion device comprises DC2 material.

1012. The method of claim 980, wherein the expansion device comprises DC3 material.

1013. The method of claim 980, wherein the expansion device comprises DC5 material.

1014. The method of claim 980, wherein the expansion device comprises DC7 material.

1015. The method of claim 980, wherein the expansion device comprises M2 material.

1016. The method of claim 980, wherein the expansion device comprises CPM M4 material.

1017. The method of claim 980, wherein the expansion device comprises 10V material.

1018. The method of claim 980, wherein the expansion device comprises 3V material.

1018. The method of claim 980, wherein the expansion device comprises an REM finish.

1020. The method of claim 980, wherein the expansion device comprises a processed finish.

1021. The method of claim 980, wherein the expansion device comprises a relatively smooth surface roughness.

1022. The method of claim 980, wherein the expansion device comprises a relatively smooth surface roughness and includes relatively evenly space oil pockets.

1023. The method of claim 980, wherein the expansion device comprises a smooth surface roughness in the range of 0.02 to 0.1 micrometers

1024. The method of claim 980, additionally comprising:
injecting lubricant through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

1025. The method of claim 980, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion;
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 30 degrees and the expansion surfaces are located on the tapered portion.

1026. The method of claim 980, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion;
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 10 degrees and the expansion surfaces are located on the tapered portion.

1027. The method of claim 980, wherein the lubricant comprises at least nine components selected from the group consisting of:

a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

1028. The method of claim 980, wherein the expansion device, comprises:

a tapered portion having a tapered faceted polygonal outer expansion surface.

1029. The method of claim 980, wherein the tubular member has a non-uniform wall thickness and the expansion device comprises:

a tapered portion having a tapered faceted polygonal outer expansion surface.

1030. The method of claim 980, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device; additionally comprising:

charging the capacitor;

discharging the capacitor through the electrodes; and

injecting the lubricant through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1031. The method of claim 980, wherein the tubular member comprises a wellbore casing.

1032. The method of claim 980, wherein the tubular member comprises a pipeline.

1033. The method of claim 980, wherein the tubular member comprises a structural support.

1034. The method of claim 980, wherein the expansion device comprises an expansion cone.

1035. A lubricant delivery assembly for radially expanding and plastically deforming a tubular member, comprising:

an expansion device having a tapered portion with an outer surface, at least one reservoir for housing a lubricant, at least one circumferential groove on the outer surface fluidicly connected to the reservoir; and

a lubricant injection mechanism to force lubricant into the at least one circumferential groove while radially expanding and plastically deforming the tubular member when a predetermined lubricant pressure is reached.

1036. The lubricant delivery assembly of claim 911, wherein the lubricant injection mechanism is a valve and the lubricant is drilling fluid received in the reservoir.

1037. The lubricant delivery assembly of claim 911, wherein the reservoir is fluidicly connected to drilling fluid used to expand the tubular member,

the lubricant injection mechanism, comprising

a pressure accelerator received within the reservoir that separates the drilling fluid and the media.

1038. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge with a predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member, wherein the sliding angle is less than or equal to 30 degrees.

1039. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member.

1040. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member,

wherein the lubricant in the leading portion is at pressure different from the lubricant in the tapered portion.

1041. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge with a second predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member; wherein the second sliding angle is less than or equal to 30 degrees.

1042. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge with a second predetermined sliding angle on the outer surface of the tapered

portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member; wherein the second sliding angle is less than or equal to 30 degrees.

1043. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member from the internal flow passage;

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge with a second predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member; wherein the second sliding angle is less than or equal to 30 degrees,

wherein the lubricant in the leading portion is at pressure different from the lubricant in the tapered portion.

1044. A method of reducing the coefficient of friction between the expansion device and the tubular member during radial expansion to less than 0.08, comprising:

altering at least one of the elements selected from the group consisting of: expansion device geometry, expansion device composition, expansion device surface roughness, expansion device texture, expansion device coating, lubricant composition, lubricant environmental issues, lubricant frictional modifiers, tubular member roughness, and tubular member coating.

1045. A method of reducing the coefficient of friction between the expansion device and the tubular member during radial expansion to less than or equal to 0.05, comprising:

altering at least one of the elements selected from the group consisting of: expansion device geometry, expansion device composition, expansion device surface roughness, expansion device texture, expansion device coating, lubricant composition, lubricant environmental issues, lubricant frictional modifiers, tubular member roughness, and tubular member coating.

1045. A method of reducing the coefficient of friction between the expansion device and the tubular member during radial expansion to less than or equal to 0.02, comprising:

altering at least one of the elements selected from the group consisting of: expansion device geometry, expansion device composition, expansion device surface roughness, expansion device texture, expansion device coating, lubricant composition, lubricant environmental issues, lubricant frictional modifiers, tubular member roughness, and tubular member coating.

1046. A lubrication system for lubricating an interface between a first element and a second element, comprising:

a vaporizer proximate to the interface for vaporizing a lubricant to inject the lubricant in the interface.

1047. The system of claim 1046, wherein the first element comprises an expansion device and the second element comprises tubular member during radial expansion and plastic deformation of the tubular member.

1048. The lubrication system of claim 1046, wherein the vaporizer comprises:

a reservoir for housing a lubricant; and

an electric pulse generator to create an electric pulse in the lubricant.

1049. The lubrication system of claim 1048, wherein the electric impulse generator comprises:

at least two electrodes housed in the reservoir; and

at least one capacitor electrically coupled to the electrode.

1051. The lubrication system of claim 1046, wherein the vaporizer comprises:

a reservoir for housing a lubricant; and

an magnetic pulse generator to create a magnetic pulse in the lubricant.

1052. The lubrication system of claim 1051, wherein the electric impulse generator comprises:

magnetic coil housed in the reservoir.

1053. The lubrication system of claim 1046, wherein the lubrication system additionally comprises:

an expansion device for positioning in a tubular member; and
wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

1054. The lubrication system of claim 1053, wherein the coefficient of friction is in the range of .02 to 0.05.

1055. The lubrication system of claim 1053, additionally comprising:
lubricant between the tubular member and the expansion device.

1056. The lubrication system of claim 1055, wherein the lubricant comprises oil based.

1057. The lubrication system of claim 1055, wherein the lubricant comprises H1 oil.

1058. The lubrication system of claim 1055, wherein the lubricant comprises H2 oil.

1059. The lubrication system of claim 1055, wherein the lubricant comprises H3 oil.

1060. The lubrication system of claim 1055, wherein the lubricant comprises H4 oil.

1061. The lubrication system of claim 1055, wherein the lubricant comprises H5 oil.

1062. The lubrication system of claim 1055, wherein the lubricant comprises H6 oil.

1063. The lubrication system of claim 1055, wherein the lubricant comprises H7 oil.

1064. The lubrication system of claim 1055, wherein the lubricant comprises grease.

1065. The lubrication system of claim 1055, wherein the lubricant comprises water based.

1066. The lubrication system of claim 1055, wherein the lubricant comprises drilling mud.

1067. The lubrication system of claim 1055, wherein the lubricant comprises drilling mud.

1068. The lubrication system of claim 1055, wherein the lubricant comprises drilling mud and solid lubricants.

1069. The lubrication system of claim 1055, wherein the lubricant comprises grease combined with a solid lubricant.

1070. The lubrication system of claim 1055, wherein the lubricant comprises at least 10% Graphite.

1071. The lubrication system of claim 1055, wherein the lubricant comprises at least 10% Molybdenum Disulfide.

1072. The lubrication system of claim 1053, additionally comprising:
a coating on the expansion device.

1073. The lubrication system of claim 1072, wherein the coating comprises Phygen film.

1074. The lubrication system of claim 1053, additionally comprising:
a coating on the tubular member.

1075. The lubrication system of claim 1074, wherein the coating comprises PTFE.

1076. The lubrication system of claim 1074, wherein the coating comprises PTFE based.

1077. The lubrication system of claim 1074, wherein the coating comprises graphite based.

1078. The lubrication system of claim 1053, wherein the expansion device comprises DC53 material.

1079. The lubrication system of claim 1053, wherein the expansion device comprises DC2 material.

1080. The lubrication system of claim 1053, wherein the expansion device comprises DC3 material.

1081. The lubrication system of claim 1053, wherein the expansion device comprises DC5 material.

1082. The lubrication system of claim 1053, wherein the expansion device comprises DC7 material.

1083. The lubrication system of claim 1053, wherein the expansion device comprises M2 material.

1084. The lubrication system of claim 1053, wherein the expansion device comprises CPM M4 material.

1085. The lubrication system of claim 1053, wherein the expansion device comprises 10V material.

1086. The lubrication system of claim 1053, wherein the expansion device comprises 3V material.

1088. The lubrication system of claim 1053, wherein the expansion device comprises an REM finish.

1089. The lubrication system of claim 1053, wherein the expansion device comprises a processed finish.

1090. The lubrication system of claim 1053, wherein the expansion device has a relatively smooth surface roughness.

1091. The lubrication system of claim 1053, wherein the expansion device has a relatively smooth surface roughness and includes relatively evenly space oil pockets.

1092. The lubrication system of claim 1053, wherein the expansion device has a smooth surface roughness in the range of 0.02 to 0.1 micrometers

1093. The lubrication system of claim 1053, wherein lubricant is injected through at least a portion of the expansion device between the tubular member and the expansion device.

1094. The lubrication system of claim 1053, wherein lubricant is injected through at least a portion of the expansion device between the tubular member and the expansion device when a predetermined lubricant pressure is met.

1095. The lubrication system of claim 1053, wherein lubricant is injected through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

1096. The lubrication system of claim 1053, wherein the expansion device comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 30 degrees.

1097. The lubrication system of claim 1053, wherein the expansion device comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 10 degrees.

1098. The lubrication system of claim 1053, additionally comprising
lubricant between the tubular member and the expansion device, comprising at least nine components selected from the group consisting of:
a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

1099. The lubrication system of claim 1053, wherein the expansion device comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

1100. The lubrication system of claim 1053, wherein the tubular member has a non-uniform wall thickness and the expansion device comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

1101. The lubrication system of claim 1053, wherein at least one capacitor comprises a capacitor bank.

1102. The lubrication system of claim 1053, wherein the tubular member comprises a wellbore casing.

1103. The lubrication system of claim 1053, wherein the tubular member comprises a pipeline.

1104. The lubrication system of claim 1053, wherein the tubular member comprises a structural support.

1105. The lubrication system of claim 1053, wherein the expansion device comprises an expansion cone.

1107. A method for lubricating an interface between a first element and a second element, comprising:

vaporizing a lubricant proximate to the interface to inject the lubricant in the interface.

1108. The method of claim 1107, wherein the first element comprises an expansion device and the second element comprises tubular member during radial expansion and plastic deformation of the tubular member.

1109. The method of claim 1107, additionally comprising:

housing a lubricant in a reservoir having an exit passageway; and

generating an electric pulse in the reservoir, thereby vaporizing the lubricant and causing a pressure pulse to force lubricant out of the exit passageway.

1110. The method of claim 1109, wherein the electric pulse is generated by discharging a capacitor through electrodes stored in the lubricant.

1111. The method of claim 1107, additionally comprising:

housing a lubricant in a reservoir having an exit passageway; and

generating a magnetic pulse in the reservoir, thereby vaporizing the lubricant and causing a pressure pulse to force lubricant out of the exit passageway.

1112. The method of claim 1111, wherein the magnetic pulse is generated by current running current through magnetic coils stored in the lubricant.

1113. A method of claim 1070, additionally comprising:
positioning an expansion device having a first tapered end and a second end at least partially within the tubular member;
displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and
wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

1114. The method of claim 1113, wherein the coefficient of friction is in the range of .02 to 0.05.

1115. The method of claim 1113, additionally comprising:
injecting lubricant between the tubular member and the expansion device;

1116. The method of claim 1115, wherein the lubricant comprises oil based.

1117. The method of claim 1115, wherein the lubricant comprises H1 oil.

1118. The method of claim 1115, wherein the lubricant comprises H2 oil.

1119. The method of claim 1115, wherein the lubricant comprises H3 oil.

1120. The method of claim 1115, wherein the lubricant comprises H4 oil.

1121. The method of claim 1115, wherein the lubricant comprises H5 oil.

1122. The method of claim 1115, wherein the lubricant comprises H6 oil.

1123. The method of claim 1115, wherein the lubricant comprises H7 oil.

1124. The method of claim 1115, wherein the lubricant comprises grease.

1125. The method of claim 1115, wherein the lubricant comprises water based.

1126. The method of claim 1115, wherein the lubricant comprises drilling mud.

1127. The method of claim 1115, wherein the lubricant comprises drilling mud.

1128. The method of claim 1115, wherein the lubricant comprises drilling mud and solid lubricants.

1129. The method of claim 1115, wherein the lubricant comprises grease combined with a solid lubricant.

1130. The method of claim 1115, wherein the lubricant includes at least 10% Graphite.

1131. The method of claim 1115, wherein the lubricant includes at least 10% Molybdenum Disulfide.

1132. The method of claim 1113, additionally comprising
applying a coating on the expansion device prior to positioning within the tubular member.

1133. The method of claim 1132, wherein the coating comprises Phygen film.

1134. The method of claim 1113, additionally comprising
applying a coating on the tubular member prior to positioning the expansion device within the tubular member.

1135. The method of claim 1134, wherein the coating comprises PTFE.

1136. The method of claim 1134, wherein the coating comprises PTFE based.

1137. The method of claim 1134, wherein the coating comprises graphite based.

1138. The method of claim 1113, wherein the expansion device comprises DC53 material.

1139. The method of claim 1113, wherein the expansion device comprises DC2 material.

1140. The method of claim 1113, wherein the expansion device comprises DC3 material.

1141. The method of claim 1113, wherein the expansion device comprises DC5 material.

1142. The method of claim 1113, wherein the expansion device comprises DC7 material.

1143. The method of claim 1113, wherein the expansion device comprises M2 material.

1144. The method of claim 1113, wherein the expansion device comprises CPM M4 material.

1145. The method of claim 1113, wherein the expansion device comprises 10V material.

1146. The method of claim 1113, wherein the expansion device comprises 3V material.

1147. The method of claim 1113, wherein the expansion device comprises an REM finish.

1148. The method of claim 1113, wherein the expansion device comprises a processed finish.

1149. The method of claim 1113, wherein the expansion device has a relatively smooth surface roughness.

1150. The method of claim 1113, wherein the expansion device has a relatively smooth surface roughness and includes relatively evenly space oil pockets.

1151. The method of claim 1113, wherein the expansion device has a smooth surface roughness in the range of 0.02 to 0.1 micrometers

1152. The method of claim 1113, additionally comprising:
injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device.

1153. The method of claim 1113, additionally comprising:
injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device when a predetermined lubricant pressure is met.

1154. The method of claim 1113, additionally comprising:

injecting lubricant through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

1155. The method of claim 1113, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 30 degrees.

1156. The method of claim 1113, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 10 degrees.

1157. The method of claim 1113, additionally comprising
injecting lubricant between the tubular member and the expansion device, comprising at least nine components selected from the group consisting of:
a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

1158. The method of claim 1113, wherein the expansion device, comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

1159. The method of claim 1113, wherein the tubular member has a non-uniform wall thickness and the expansion device comprises:
a tapered portion having a tapered faceted polygonal outer expansion surface.

1160. The method of claim 1113, wherein the at least one capacitor comprises a capacitor bank.

1161. The method of claim 1113, wherein the tubular member comprises a wellbore casing.

1162. The method of claim 1113, wherein the tubular member comprises a pipeline.

1163. The method of claim 1113, wherein the tubular member comprises a structural support.

1164. The method of claim 1113, wherein the expansion device comprises an expansion cone.

1165. A system for lubricating an interface between a first element and a second element, comprising:

means vaporizing a lubricant proximate to the interface to inject the lubricant in the interface.

1166. The system of claim 1165, wherein the first element comprises an expansion device and the second element comprises tubular member during radial expansion and plastic deformation of the tubular member.

1167. The system of claim 1165, wherein the means for vaporizing comprise:

means for housing a lubricant in a reservoir having an exit passageway;

means for generating an electric pulse in the reservoir, thereby vaporizing the lubricant and causing a pressure pulse to force lubricant out of the exit passageway.

1168. The system of claim 1167, wherein the electric pulse is generated by discharging a capacitor through electrodes stored in the lubricant.

1169. The system of claim 1165, wherein the means for vaporizing comprises:

means for housing a lubricant in a reservoir having an exit passageway;

means for generating a magnetic pulse in the reservoir, thereby vaporizing the lubricant and causing a pressure pulse to force lubricant out of the exit passageway.

1170. The system of claim 1169, wherein the magnetic pulse is generated by current running current through magnetic coils stored in the lubricant.

1171. The system of claim 1165, additionally comprising:
means for positioning an expansion device having a first tapered end and a second end at least partially within a tubular member;
means for displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and
wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

1172. The system of claim 1171, wherein the coefficient of friction is in the range of .02 to 0.05.

1173. The system of claim 1171, additionally comprising
means for injecting lubricant between the tubular member and the expansion device;

1174. The system of claim 1173, wherein the lubricant comprises oil based.

1173. The system of claim 1173, wherein the lubricant comprises H1 oil.

1176. The system of claim 1173, wherein the lubricant comprises H2 oil.

1177. The system of claim 1173, wherein the lubricant comprises H3 oil.

1178. The system of claim 1173, wherein the lubricant comprises H4 oil.

1179. The system of claim 1173, wherein the lubricant comprises H5 oil.

1180. The system of claim 1173, wherein the lubricant comprises H6 oil.

1181. The system of claim 1173, wherein the lubricant comprises H7 oil.

1182. The system of claim 1173, wherein the lubricant comprises grease.

1183. The system of claim 1173, wherein the lubricant comprises water based.

1184. The system of claim 1173, wherein the lubricant comprises drilling mud.

1185. The system of claim 1173, wherein the lubricant comprises drilling mud.

1186. The system of claim 1173, wherein the lubricant comprises drilling mud and solid lubricants.

1187. The system of claim 1173, wherein the lubricant comprises grease combined with a solid lubricant.

1188. The system of claim 1173, wherein the lubricant includes at least 10% Graphite.

1189. The system of claim 1173, wherein the lubricant includes at least 10% Molybdenum Disulfide.

1190. The system of claim 1171, additionally comprising
means for applying a coating on the expansion device prior to positioning within the tubular member.

1191. The system of claim 1190, wherein the coating comprises Phygen film.

1192. The system of claim 1190, wherein the coating comprises PTFE based.

1193. The system of claim 1190, wherein the coating comprises graphite based.

1194. The system of claim 1171, wherein the expansion device comprises DC53 material.

1195. The system of claim 1171, wherein the expansion device comprises DC2 material.

1196. The system of claim 1171, wherein the expansion device comprises DC3 material.

1196. The system of claim 1171, wherein the expansion device comprises DC5 material.

1198. The system of claim 1171, wherein the expansion device comprises DC7 material.

1199. The system of claim 1171, wherein the expansion device comprises M2 material.

1200. The system of claim 1171, wherein the expansion device comprises CPM M4 material.

1201. The system of claim 1171, wherein the expansion device comprises 10V material.

1202. The system of claim 1171, wherein the expansion device comprises 3V material.

1203. The system of claim 1171, wherein the expansion device comprises an REM finish.

1204. The system of claim 1171, wherein the expansion device comprises a processed finish.

1205. The system of claim 1171, wherein the expansion device comprises a relatively smooth surface roughness.

1206. The system of claim 1171, wherein the expansion device comprises a relatively smooth surface roughness and includes relatively evenly space oil pockets.

1207. The system of claim 1171, wherein the expansion device comprises a smooth surface roughness in the range of 0.02 to 0.1 micrometers

1208. The system of claim 1171, additionally comprising:
means for injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device.

1209. The system of claim 1171, additionally comprising:
means for injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device when a predetermined lubricant pressure is met.

1210. The system of claim 1171, additionally comprising:
means for injecting lubricant through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

1211. The system of claim 1171, wherein the expansion device, comprises:
a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

wherein the sliding angle is less than or equal to 30 degrees.

1212. The system of claim 1171, wherein the expansion device, comprises:

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

wherein the sliding angle is less than or equal to 10 degrees.

1213. The system of claim 1171, additionally comprising

means for injecting lubricant between the tubular member and the expansion device, comprising at least nine components selected from the group consisting of:

a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

1214. The system of claim 1171, wherein the expansion device, comprises:

a tapered portion having a tapered faceted polygonal outer expansion surface.

1215. The system of claim 1171, wherein the tubular member has a non-uniform wall thickness and the expansion device comprises:

a tapered portion having a tapered faceted polygonal outer expansion surface.

1216. The system of claim 1171, wherein at least one capacitor comprises a capacitor bank.

1217. The system of claim 1171, wherein the tubular member comprises a wellbore casing.

1218. The system of claim 1171, wherein the tubular member comprises a pipeline.

1219. The system of claim 1171, wherein the tubular member comprises a structural support.

1220. The system of claim 1171, wherein the expansion device comprises an expansion cone.

1221. A system for radially expanding and plastically deforming a tubular member, comprising:

an expansion device positioned in the tubular member; and

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08 and

wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1222. A system for radially expanding and plastically deforming a tubular member, comprising:

an expansion device positioned in the tubular member; and

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08 and

wherein lubricant is stored in a reservoir and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1223. A method of radially expanding and plastically deforming a tubular member, comprising:

positioning an expansion device having a first tapered end and a second end at least partially within the tubular member;

displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and

injecting a lubricant stored in a reservoir with a magnetic coil in the expansion device through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil, and

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

1224. A method of radially expanding and plastically deforming a tubular member, comprising:

positioning an expansion device having a first tapered end and a second end at least partially within the tubular member;

displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and

vaporizing a lubricant stored in a reservoir in the expansion device and injecting it through at least a portion of the expansion device between the tubular member and the expansion device, and

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

1225. A system for radially expanding and plastically deforming a tubular member, comprising:

means for positioning an expansion device having a first tapered end and a second end at least partially within the tubular member;

means for displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08 and

wherein lubricant is stored in a reservoir and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1226. A system for radially expanding and plastically deforming a tubular member, comprising:

means for positioning an expansion device having a first tapered end and a second end at least partially within the tubular member;

means for displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08 and

wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1227. A system for radially expanding and plastically deforming a tubular member, comprising:

means for positioning an expansion device having a first tapered end and a second end at least partially within the tubular member;

means for displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and

means for vaporizing lubricant stored in a reservoir and injecting it through at least a portion of the expansion device between the tubular member and the expansion device,

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08.

1228. A system for radially expanding and plastically deforming a tubular member, comprising:

means for positioning an expansion device having a first tapered end and a second end at least partially within the tubular member;

means for displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member; and

means for vaporizing lubricant stored in a reservoir and injecting it through at least a portion of the expansion device between the tubular member and the expansion device,

wherein the coefficient of friction between the expansion device and the tubular member during radial expansion and plastic deformation is less than 0.08 and

wherein means for vaporizes comprises a magnetic coil in the reservoir operably connected to a power source.

1229. An expansion device for radially expanding and plastically deforming the tubular member, comprising:

one or more expansion surfaces on the expansion device for engaging the interior surface of the tubular member during the radial expansion and plastic deformation of the tubular member; and

a lubrication device operably coupled to the expansion surface for injecting lubricant into an interface between the expansion surface and the tubular member during the radial expansion and plastic deformation of the tubular member when a predetermined lubricant pressure is reached,

wherein lubricant is stored in a reservoir in the lubrication device and injected through

at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1230. An expansion device for radially expanding and plastically deforming the tubular member, comprising:

one or more expansion surfaces on the expansion device for engaging the interior surface of the tubular member during the radial expansion and plastic deformation of the tubular member; and

a lubrication device operably coupled to the expansion surface for injecting lubricant into an interface between the expansion surface and the tubular member during the radial expansion and plastic deformation of the tubular member when a predetermined lubricant pressure is reached, and

wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1231. A method for radially expanding and plastically deforming the tubular member, comprising:

positioning an expansion device having one or more expansion surfaces in the interior surface of the tubular member;

displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member;

operating a lubrication device to inject lubricant into an interface between the expansion surface and the tubular member when a predetermined lubricant pressure is reached, and

wherein lubricant is stored in a reservoir in the lubrication device and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1232. A method for radially expanding and plastically deforming the tubular member, comprising:

positioning an expansion device having one or more expansion surfaces in the interior surface of the tubular member;

displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member;

operating a lubrication device to inject lubricant into an interface between the

expansion surface and the tubular member when a predetermined lubricant pressure is reached, and

wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1233. A lubricant delivery assembly for radially expanding and plastically deforming a tubular member, comprising:

an expansion device having a tapered portion with an outer surface, at least one reservoir for housing a lubricant, at least one circumferential groove on the outer surface fluidicly connected to the reservoir; and

a lubricant injection mechanism to force lubricant into the at least one circumferential groove while radially expanding and plastically deforming the tubular member when a predetermined lubricant pressure is reached.

1234. The lubricant delivery assembly of claim 1233, wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1235. The lubricant delivery assembly of claim 1233, wherein lubricant is stored in a reservoir in the lubrication device and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1235. The lubricant delivery assembly of claim 1233, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1236. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge with a predetermined sliding angle on the outer surface of the tapered portion

fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 30 degrees.

1237. The expansion device of claim 1236, wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1238. The expansion device of claim 1236, wherein lubricant is stored in a reservoir in the lubrication device and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1239. The expansion device of claim 1237, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1240. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;
internal flow passage in the leading portion;
at least one circumferential groove on the outer surface of the tapered portion
fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove on the outer surface of the tapered portion
fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member.

1241. The lubricant delivery assembly of claim 1240, wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1242. The expansion device of claim 1240, wherein lubricant is stored in a reservoir in the

lubrication device and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1243. The expansion device of claim 1240, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1244. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

wherein the lubricant in the leading portion is at pressure different from the lubricant in the tapered portion.

1245. The expansion device of claim 1244, wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1246. The expansion device of claim 1244, wherein lubricant is stored in a reservoir in the lubrication device and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1247. The expansion device of claim 1244, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1248. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion;

at least one circumferential groove having a first edge and a second edge with a second predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member; wherein the second sliding angle is less than or equal to 30 degrees.

1249. The expansion device of claim 1248, wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1250. The expansion device of claim 1248, wherein lubricant is stored in a reservoir in the lubrication device and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1251. The expansion device of claim 1248, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1252. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion;

at least one circumferential groove having a first edge and a second edge with a second predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member; wherein the second sliding angle is less than or equal to 30 degrees.

1253. The expansion device of claim 1252, wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1254. The expansion device of claim 1252, wherein lubricant is stored in a reservoir in the lubrication device and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1255. The expansion device of claim 1252, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1256. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member from the internal flow passage;

a tapered portion with an outer surface;

internal flow passage in the tapered portion;

at least one circumferential groove having a first edge and a second edge with a second predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member; wherein the second sliding angle is less than or equal to 30 degrees;

wherein the lubricant in the leading portion is at pressure different from the lubricant in the tapered portion.

1257. The expansion device of claim 1256, wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1258. The expansion device of claim 1256, wherein lubricant is stored in a reservoir in the lubrication device and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1259. The expansion device of claim 1256, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1260. A method of reducing the coefficient of friction between the expansion device and the tubular member during radial expansion to less than 0.08, comprising:

altering at least one of the elements selected from the group consisting of: expansion device geometry, expansion device composition, expansion device surface roughness, expansion device texture, expansion device coating, lubricant composition, lubricant environmental issues, lubricant frictional modifiers, tubular member roughness, and tubular member coating.

1261. The method of claim 1260, wherein lubricant is stored in a reservoir with a magnetic coil in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when current runs through the magnetic coil.

1262. The method of claim 1260, wherein lubricant is stored in a reservoir in the lubrication device and injected through at least a portion of the expansion device between the tubular member and the expansion device when vaporized.

1263. The method of claim 1260, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion

device when the capacitors discharges.

1264. A system for radially expanding and plastically deforming a tubular member having a non-uniform wall thickness, comprising:

an expansion device having one or more expansion surfaces and a tapered portion having a tapered faceted polygonal outer expansion surface in the interior surface of the tubular member.

1265. The system of claim 1264, additionally comprising:

lubricant between the tubular member and the expansion device.

1266. The system of claim 1265, wherein the lubricant comprises oil based.

1267. The system of claim 1265, wherein the lubricant comprises H1 oil.

1268. The system of claim 1265, wherein the lubricant comprises H2 oil.

1269. The system of claim 1265, wherein the lubricant comprises H3 oil.

1270. The system of claim 1265, wherein the lubricant comprises H4 oil.

1271. The system of claim 1265, wherein the lubricant comprises H5 oil.

1272. The system of claim 1265, wherein the lubricant comprises H6 oil.

1273. The system of claim 1265, wherein the lubricant comprises H7 oil.

1274. The system of claim 1265, wherein the lubricant comprises grease.

1275. The system of claim 1265, wherein the lubricant comprises water based.

1276. The system of claim 1265, wherein the lubricant comprises drilling mud.

1277. The system of claim 1265, wherein the lubricant comprises drilling mud.

1278. The system of claim 1265, wherein the lubricant comprises drilling mud and solid lubricants.

1279. The system of claim 1265, wherein the lubricant comprises grease combined with a solid lubricant.

1280. The system of claim 1265, wherein the lubricant comprises at least 10% Graphite.

1281. The system of claim 1265, wherein the lubricant comprises at least 10% Molybdenum Disulfide.

1282. The system of claim 1264, additionally comprising:
a coating on the expansion device.

1283. The system of claim 1282, wherein the coating comprises Phygen film.

1284. The system of claim 1264, additionally comprising:
a coating on the tubular member.

1285. The system of claim 1284, wherein the coating comprises PTFE.

1286. The system of claim 1284, wherein the coating comprises PTFE based.

1287. The system of claim 1285, wherein the coating comprises graphite based.

1288. The system of claim 1264, wherein the expansion device comprises DC53 material.

1289. The system of claim 1264, wherein the expansion device comprises DC2 material.

1290. The system of claim 1264, wherein the expansion device comprises DC3 material.

1291. The system of claim 1264, wherein the expansion device comprises DC5 material.

1292. The system of claim 1264, wherein the expansion device comprises DC7 material.

1293. The system of claim 1264, wherein the expansion device comprises M2 material.

1294. The system of claim 1264, wherein the expansion device comprises CPM M4 material.

1295. The system of claim 1264, wherein the expansion device comprises 10V material.

1296. The system of claim 1264, wherein the expansion device comprises 3V material.

1297. The system of claim 1264, wherein the expansion device comprises an REM finish.

1298. The system of claim 1264, wherein the expansion device comprises a processed finish.

1299. The system of claim 1264, wherein the expansion device has a relatively smooth surface roughness.

1300. The system of claim 1264, wherein the expansion device has a relatively smooth surface roughness and includes relatively evenly space oil pockets.

1301. The system of claim 1264, wherein the expansion device has a smooth surface roughness in the range of 0.02 to 0.1 micrometers

1302. The system of claim 1264, wherein lubricant is injected through at least a portion of the expansion device between the tubular member and the expansion device.

1303. The system of claim 1264, wherein lubricant is injected through at least a portion of the expansion device between the tubular member and the expansion device when a predetermined lubricant pressure is met.

1304. The system of claim 1264, wherein lubricant is injected through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

1305. The system of claim 1264, wherein the expansion device comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

wherein the sliding angle is less than or equal to 30 degrees.

1306. The system of claim 1264, wherein the expansion device comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
wherein the sliding angle is less than or equal to 10 degrees.

1307. The system of claim 1264, additionally comprising
lubricant between the tubular member and the expansion device, comprising at least nine components selected from the group consisting of:
a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

1308. The system of claim 1264, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1309. The system of claim 1264, wherein the tubular member comprises a wellbore casing.

1310. The system of claim 1264, wherein the tubular member comprises a pipeline.

1311. The system of claim 1264, wherein the tubular member comprises a structural support.

1312. The system of claim 1264, wherein the expansion device comprises an expansion cone.

1313. A method of radially expanding and plastically deforming a tubular member having a non-uniform wall thickness, comprising:

positioning an expansion device having one or more expansion surfaces and a tapered portion having a tapered faceted polygonal outer expansion surface in the interior surface of the tubular member; and

displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member.

1314. The method of claim 1313, additionally comprising:

injecting lubricant between the tubular member and the expansion device;

1315. The method of claim 1210, wherein the lubricant comprises oil based.

1316. The method of claim 1315, wherein the lubricant comprises H1 oil.

1317. The method of claim 1315, wherein the lubricant comprises H2 oil.

1318. The method of claim 1315, wherein the lubricant comprises H3 oil.

1319. The method of claim 1315, wherein the lubricant comprises H4 oil.

1320. The method of claim 1315, wherein the lubricant comprises H5 oil.

1321. The method of claim 1315, wherein the lubricant comprises H6 oil.

1322. The method of claim 1315, wherein the lubricant comprises H7 oil.

1323. The method of claim 1315, wherein the lubricant comprises grease.

1324. The method of claim 1315, wherein the lubricant comprises water based.

1325. The method of claim 1315, wherein the lubricant comprises drilling mud.

1326. The method of claim 1315, wherein the lubricant comprises drilling mud.

1327. The method of claim 1315, wherein the lubricant comprises drilling mud and solid lubricants.

1328. The method of claim 1315, wherein the lubricant comprises grease combined with a solid lubricant.

1329. The method of claim 1315, wherein the lubricant includes at least 10% Graphite.

1330. The method of claim 1315, wherein the lubricant includes at least 10% Molybdenum Disulfide.

1331. The method of claim 1313, additionally comprising
applying a coating on the expansion device prior to positioning within the tubular member.

1332. The method of claim 1331, wherein the coating comprises Phygen film.

1333. The method of claim 1313, additionally comprising
applying a coating on the tubular member prior to positioning the expansion device within the tubular member.

1334. The method of claim 1333, wherein the coating comprises PTFE.

1335. The method of claim 1333, wherein the coating comprises PTFE based.

1336. The method of claim 1333, wherein the coating comprises graphite based.

1337. The method of claim 1313, wherein the expansion device comprises DC53 material.

1338. The method of claim 1313, wherein the expansion device comprises DC2 material.

1339. The method of claim 1313, wherein the expansion device comprises DC3 material.

1340. The method of claim 1313, wherein the expansion device comprises DC5 material.

1341. The method of claim 1313, wherein the expansion device comprises DC7 material.

1342. The method of claim 1313, wherein the expansion device comprises M2 material.

1343. The method of claim 1313, wherein the expansion device comprises CPM M4 material.

1344. The method of claim 1313, wherein the expansion device comprises 10V material.

1345. The method of claim 1313, wherein the expansion device comprises 3V material.

1346. The method of claim 1313, wherein the expansion device comprises an REM finish.

1347. The method of claim 1313, wherein the expansion device comprises a processed finish.

1348. The method of claim 1313, wherein the expansion device has a relatively smooth surface roughness.

1349. The method of claim 1313, wherein the expansion device has a relatively smooth surface roughness and includes relatively evenly space oil pockets.

1350. The method of claim 1313, wherein the expansion device has a smooth surface roughness in the range of 0.02 to 0.1 micrometers

1351. The method of claim 1313, additionally comprising:
injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device.

1352. The method of claim 1313, additionally comprising:
injecting lubricant through at least a portion of the expansion device between the tubular member and the expansion device when a predetermined lubricant pressure is met.

1353. The method of claim 1313, additionally comprising:
injecting lubricant through at least two portions of the expansion device between the tubular member and the expansion device at two different pressures.

1354. The method of claim 1313, wherein the expansion device, comprises:
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

wherein the sliding angle is less than or equal to 30 degrees.

1355. The method of claim 1313, wherein the expansion device, comprises:

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge having with a sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

wherein the sliding angle is less than or equal to 10 degrees.

1356. The method of claim 1313, additionally comprising

injecting lubricant between the tubular member and the expansion device, comprising at least nine components selected from the group consisting of:

a base oil; metal deactivator; antioxidants; sulfurized natural oils; phosphate ester; phosphoric acid; viscosity modifier; pour-point depressant; defoamer; and carboxylic acid soaps.

1357. The method of claim 1313, wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device; additionally comprising:

charging the capacitor;

discharging the capacitor through the electrodes; and

injecting the lubricant through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1358. The method of claim 1313, wherein the tubular member comprises a wellbore casing.

1359. The method of claim 1313, wherein the tubular member comprises a pipeline.

1360. The method of claim 1313, wherein the tubular member comprises a structural support.

1361. The method of claim 1313, wherein the expansion device comprises an expansion cone.

1362. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge with a predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member, wherein the sliding angle is less than or equal to 30 degrees; and

wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1363. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member,

wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1364. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member,

wherein the lubricant in the leading portion is at pressure different from the lubricant in the tapered portion, and

wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1365. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;

internal flow passage in the leading portion;

at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;

a tapered portion with an outer surface;

internal flow passage in the tapered portion; and

at least one circumferential groove having a first edge and a second edge with a second predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member; wherein the second sliding angle is less than or equal to 30 degrees,

wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1366. An expansion device for radially expanding and plastically deforming a tubular member, comprising:

a leading portion with an outer surface;
internal flow passage in the leading portion;
at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member;
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge with a second predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member; wherein the second sliding angle is less than or equal to 30 degrees.,
wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1367. An expansion device for radially expanding and plastically deforming a tubular member, comprising:
a leading portion with an outer surface;
internal flow passage in the leading portion;
at least one circumferential groove on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member from the internal flow passage;
a tapered portion with an outer surface;
internal flow passage in the tapered portion; and
at least one circumferential groove having a first edge and a second edge with a second predetermined sliding angle on the outer surface of the tapered portion fluidicly coupled to the internal flow passage for receiving lubricant during radial expansion and plastic deformation of the tubular member; wherein the second sliding angle is less than or equal to 30 degrees;
wherein the lubricant in the leading portion is at pressure different from the lubricant in the tapered portion, and
wherein lubricant is stored in a reservoir with electrodes that are electrically coupled a capacitor in the expansion device and is injected through at least a portion

of the expansion device between the tubular member and the expansion device when the capacitors discharges.

1368. A system for radially expanding and plastically deforming a tubular member having non-uniform wall thickness, comprising:

means for positioning an expansion device having one or more expansion surfaces and a tapered portion having a tapered faceted polygonal outer expansion surface in the interior surface of the tubular member; and

means for displacing the expansion device relative to the tubular member to radially expand and plastically deform the tubular member.

1368. A system for radially expanding and plastically deforming a tubular member, comprising:

an expansion cone of D53 material having a phygen coating and an REM finish;

H1 oil;

wherein the tubular member is coated with PTFE.

1369. A system for radially expanding and plastically deforming a tubular member having a non-uniform wall thickness, comprising:

an expansion device comprising a plurality of circumferentially spaced apart expansion elements; and

means for displacing the expansion device in a longitudinal direction relative to the tubular member during the radial expansion and plastic deformation process.